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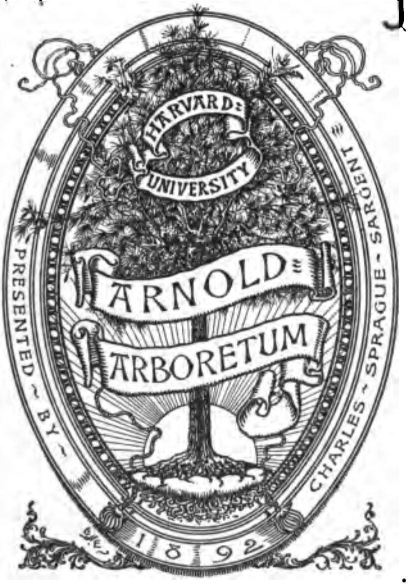

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"Here stands the Oak, the Monarch of the Wood!"

Home.

The Oak in Winter divested of its leafy ornaments,

Noble and majestic in its native dignity.

"*When unadorn'd, adorn'd the most.*"

A SERIES OF FACTS, HINTS, OBSERVATIONS, AND EXPERIMENTS

ON THE DIFFERENT MODES OF RAISING
YOUNG PLANTATIONS OF OAKS,
"FOR FUTURE NAVIES,"
FROM THE ACORN, SEEDLING,
AND LARGER PLANTS,
Shewing the Difficulties and Objections that have occurred in the
PRACTICAL PART;
WITH REMARKS UPON THE
Fencing, Draining, Pruning, and Training
YOUNG TREES;
A clear and copious Statement of the early and great Profits and
Advantages which may be derived from Plantations of mixed
and various Trees, by Care and Attention, and the
contrary Effects from Negligence.
ALSO HOW
Trees are retarded or accelerated in Growth
BY THE
MANAGEMENT OF YOUNG PLANTATIONS.
WITH
HINTS AND EXPERIMENTAL REMARKS
UPON
FRUIT TREES.
The Whole derived from actual Experience on a most extended Scale.

By *WILLIAM BILLINGTON*,

Member of the Caledonian Horticultural Society, Superintendent of
the Enclosing, Fencing, Draining, and Planting of 11000 Acres of
Land in the Forest of Dean, and about 900 Acres at Chopwell, in
the County of Durham, belonging to His Majesty; and formerly
Gardener to the late Lord Yarborough and the present Earl of
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INTRODUCTION.

Having been appointed, by the late Lord Glenbervie, surveyor-general of his Majesty's woods and forests, to superintend the enclosing, fencing, draining and planting of Dean Forest, in the year 1810, and as the raising of young oak plantations, "for future Navies," is a great national and public object, and of much interest to most landed proprietors, I trust this effort of mine to render such information to the public as came to my own knowledge and experience, on so important and interesting a subject, will not be taken amiss.

From the situation I was in, and the opportunity I had of making observations and remarks, by order of the commissioners for their information, and latterly for my own gratification, it became my duty to point out where any of the modes pursued failed of their object, or were not likely to attain it, to suggest such alterations and improvements as were more likely to answer, which were almost invariably approved of by the commissioners and authorised to be done, and which caused several deviations from the original contract during the progress of the works.

INTRODUCTION.

I flatter myself that what I shall offer in the following sheets will shew many things in a new light, to those who have not had an opportunity of so much practical experience, and interesting to most persons who have plantations of their own, or are interested or amused with such laudable pursuits. From those who have better abilities or more experience I must hope for much candour in judgment, for I have found that what I thought right, or the best way at one time, (or perhaps had thought but little about it,) more mature experience has taught me to alter my opinion on various subjects; a fact, which should teach us not to be too positive in the justness of our first thoughts.

Is it not strange, yet not more strange than true, that, while improvements in the knowledge of Agriculture, Horticulture, and every other art, have and are making such rapid progress, the knowledge and proper management of young plantations and woods should be left so far behind, although of such great public importance, and being also a favourite pursuit of most landed proprietors? I hope that what I shall have to advance upon this subject may be the means of inducing gentlemen, gardeners, and other practical men, to bend their thoughts to the further improvement and true knowledge in the art of planting, and right management of young plantations, which are of such acknowledged national as well as private importance.

I do not profess to write as a scientific man or a scholar, but to relate plain matters of fact, that have come under my own observation and experience, and in as clear and intelligible a manner as I am capable of, and to point out the errors and disadvantages that too often occur in practice, with the best way that I know of obviating them, and to render more certain the success and greatest possible advantage that may be derived from plantations in the *shortest time*, which I hope to make clear by EXPERIMENTAL FACTS, which will be found in the course of the work, shewing how trees may be forwarded or retarded in their growth, "by skill and care on the one hand, or neglect and ignorance on the other."

What I shall have to advert to chiefly in the course of this work, will be the planting, with the care and management of plantations in the first period of their growth, which is by far the most important of all; for as the human character is formed in the first 10 or 12 years, so is it with forest plantations, if the greatest care and skill are not used then, to "train them in the way they should go" when young, what can be done afterwards generally has but little effect, as the experience of all ages will testify.

I have somewhere read, that the man who can make two blades of grass grow where only one grew before, deserves some little praise; if I can be able to demonstrate that two or even three trees can grow with equal advantage to all, where only one grew before, for a given time, it will, I hope, entitle this my humble effort "to be of use in my generation," to a favourable consideration from that PUBLIC to whom I dedicate it.

CHOPWELL, W. B.
October, 1825.

A

Series of Facts, &c.

CHAP. I.

Fencing, Draining, &c.

The planting of Dean-Forest, in the county of Gloucester, commenced in the year 1809; the work was contracted for by Messrs Drivers, land and timber surveyors, Kent-road, near London, and executed by their agent, Mr Amos Sleed.

I shall first speak of the modes adopted in the Forest of Dean, before I treat of the plantations at Chopwell, which were done in a different manner, but with the same object in view, viz. the raising of oak timber for naval purposes; and which, perhaps, will be more interesting to those gentlemen who plant merely for immediate profit.

As the fencing and clearing the ground for planting were the first objects, I shall endeavour to be as brief and clear as possible on those heads.

The ground at first was cleared of most of the oak timber trees, and all other trees of different kinds. Many parts of the forest were thickly covered with the most beautiful hollies, which had originally, it is supposed, been planted for the support of the deer in severe winters, when the preservation of them was judged of more consequence than the value of the timber. Great quantities of thorn and crab trees were also cut down and cleared, for the better holing and planting according to the contract; but, towards the conclusion, it was considered an error to make it so bare, and in consequence more of the hollies remained for shelter, and upwards of 1000 acres were left to nature, where a considerable quantity of oak timber trees were standing.

None of the undergrowth was cut down at first, but the spaces were to be filled up with oaks and Spanish chesnuts, if it should appear such places were not likely to be stocked from the acorns in a natural way, or by trying the experiment again with acorns on some of the largest bare spaces, and that were more clear from growing trees; which again failing, the vacancies were filled up with large plants of oaks and Spanish chesnuts, and some ash for the moist ground. The young oaks, that were making their appearance in the brakes of undergrowth after it was enclosed and the cattle, &c. kept out, were cleared by cutting it away from the plants. But more of the nature of this work when I come to treat of the Chopwell woods.

We found a good deal of difficulty in bringing the fencing to answer the purpose of keeping out sheep, cattle, horses, mules, &c. that depastured on the uninclosed parts of the forest; and, when their range became curtailed and the pasture scanty, hunger made them very keen for a better pasture, which they were sure to find if they could get over the fences into their former haunts.

We had upwards of 100 miles of new fences, about 25 of which were stone walls, where the materials could be had convenient and cheap without the expence of hauling with teams, or wheeling too great a distance; upwards of 70 miles of earthen banks, and the rest of hedge and ditch, according to local circumstances; besides several miles of old fences, part walls, which had to be repaired and rebuilt.

The contract specified the earthen banks to be made 4 feet 6 inches wide at the bottom, 5 feet high, and 2 feet wide at the top; and a ditch 18 inches deep on the outside, with an offset 1 foot wide between the ditch and the foot of the bank; a row of furze or whins to be sown along the top of the banks, and another at the outside foot of the banks on the offsets, also at the foot of the walls on the outsides. The furze or whin to be used is what grows in the north of England, very different from the variety growing in the forest and the south of England, being much stronger and more prickly, at least much stronger spines, and of a more quick and gigantic growth, which makes it much more destructive to young plantations than the other sort. People who have not seen or remarked the two varieties, or noticed the different effects in a few years growth, cannot conceive their destructive and injurious effects in young plantations. The north of England variety flowers in the spring months, whereas the other flowers towards the end of summer or autumn. I have seen none of the kind peculiar to the south in these northern counties, or in Scotland, to the best of my recollection.

In general the earthen banks stood very well on all the wet or moory soils, and the dry thin soils on the high grounds where the turf was full of small roots of heath, furze, rushes, grass, &c.; and care was taken to build them entirely of turf, cut thin, from three to four or five inches thick, according to the nature of the turf, placing the grass-side downwards, and no loose soil to be put in the middle, except the two or three first layers, which must be well trodden down.

This is a very material circumstance, and should not be overlooked, as the durability and keeping to their form depend very much upon it. The turfs should be cut long, so as to meet each other as soon as possible; if they can be all turf, the better, as the banks stand and keep much closer to their form, and as the loose soil settles it causes them to fall in and bulge different ways.

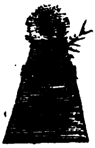
But over the soils of a loamy nature, inclining to clay or marl, or where the ground had been formerly disturbed by old coal works, or wherever the land was of such a nature that the air, water, or frosts caused it to expand or pulverise, we had the utmost difficulty in getting them to stand. The sheep and cattle, by grazing on the outsides of the banks in such soils, pulled up the grass that grew between the layers of turf by the roots, which caused them to crumble down like clay, marl, or lime, and which occasioned a great extra expence in facing the banks with fresh turf, the grass side outwards, or with stones, according to local circumstances, the contiguity of materials, and the kind of stock that frequented such parts.

When the banks entirely gave way, it occasioned gaps or breaks on the top of the whin hedge, which looked very unsightly. Sometimes only the outside turf slipped down, and did not in the least disturb the live hedge of whins; but when the whins are young, they will transplant, and it would be well to be always (as we were) provided with some young plants, to make good any failures which might arise from casualties.

But the greatest difficulties were to encounter after the banks were made, the whins sown, and prospering very well. The young whins, sown for the fence, were so tempting to the sheep and other cattle, that the sheep could get upon the banks in most places, particularly where they sloped towards the enclosures, which frequently happened on the first made banks from the middle having been filled with the loose soil. Instead of building them entirely of turf, care should be taken to keep the outsides of the banks more upright than the sides within the enclosure, as the sheep cannot get up so easily. The other cattle also could reach to crop the young whins and grass that grew upon the tops of the banks which kept the fence from getting up, so that we could not keep the sheep out of the enclosures.

Well, what was to be done? The woodmen were complaining that the sheep were continually trespassing and injuring the young plants as well as the fences; and as "necessity is the mother of invention," after various trials of laying loose branches of thorns, hollies, crabs, &c. against the banks, which were soon found to do more harm than good; for the grass grew so strong when protected and sheltered by the branches, as to encourage the moles and short-tailed field-mice to burrow and render them quite hollow and loose near the surface, which nearly ruined some of the first-made banks, and, when the cattle could get to graze upon them, soil and grass came away together.

At last, however, we hit upon a cheap method, and which perfectly succeeded. By cutting some of the strong branches of the hollies, thorns, and crabs, (or other wood, where these could not be had conveniently) into 2 feet to 2½ feet lengths, leaving the lateral or side shoots on, shortened a little on the part that would appear out of the ground, allowing a foot or 15 inches to drive in the bank, and about a foot or 15 inches out of the bank, according to the height of it; for, if left much longer, a heavy snow would be apt to break it down. The branches, or *sprags*, as we termed them, must be stuck in the bank at the outside edge of the uppermost turf projecting outwards, thus,



showing the end section of a bank, with the live hedge of whins on the top, and the dead hedge of thorns to protect it from being bruised or cropped by the sheep and cattle for the first three years. The dead thorns should be put pretty close together, to prevent the cattle getting their noses between them after the grass and young whins, which would force them out or break them off, when they become a little tainted, or rotten after the first year or two. We had a dead hedge of stronger materials, drove in at the bottom of the banks, similar to the one at the top, to keep off the sheep and cattle from grazing the banks; but this was found of little use, and abandoned, nor was the ditch at the outsides of the banks found to be of much service, but in some cases prejudicial, as it caused the foundations of the banks to give way in wet ground inclining to clay, and the banks slipped down; but still we preserved the form of the ditch to carry off the water in the wet ground, and to add to the height of the bank when necessary, but seldom the full depth. The rows of whins, ordered to be sown at the outside foot of the banks and walls, were also abandoned as of no use; in fact, we could not raise them there without incurring a great unnecessary expence. When the furze or whins are of about three years growth, they should be cut with a hook or bill with a long handle, and as wide at the base as the bank is wide at the top, sloping a little on each side to about 18 or 20 inches high. The hedge will require cutting once a year at least; for, if suffered to grow wild, it would soon get too heavy for the banks, become dead at the bottoms, and the winds and other causes would soon destroy them. In fact, without an annual clipping, they would not answer the purpose, and it would be far better not to attempt to raise them. Any person, who has noticed how the sheep and other cattle crop the whins on the commons or fells in the north of England, may form a very good idea what a beautiful, useful, and durable fence they would make.

Very cheap and beneficial fences may be raised on banks much lower than those I have described, or sown upon the level surface, and in many cases where they are growing naturally, if they could be preserved from the brousing of sheep and cattle till they have arrived at so sufficient a size and strength as not to be injured by them, which would be the case in 3, 4, or 5 years, according to the height of the bank. Such fences as these would afford the most complete shelter and warmth, are sooner and more cheaply raised, and, for the enclosure of fells or commons, would far surpass every other description of fence, as the Whin will thrive in abundance where the Quick will not.

I have formed some whin hedges at Chopwell upon the level ground from young whins, and from some that had been burnt and cut off at the ground when cleared for planting, for the inspection of any gentleman, who might wish to see such fences before he adopted the method. If the fence should chance to be burnt by any accident, as the whins will shoot from the old stumps with great vigour, two or three years will restore it to what it was before such accident if upon a bank, but a longer period is necessary if on the level ground. Where land has been overrun with whins, as is very frequent in the northern counties, if it is desirable to enclose them either for planting or cultivation, quick, cheap, and beneficial fences may be formed by cutting the whins, where they are properly situated, from each side, and leaving a row about three or four feet wide at the bottom, cutting it in a sloping manner on each side to the top; the stumps that are left will produce young shoots below where they have been cut off, and in a year or two will form a handsome evergreen hedge, both for shelter, use, and ornament; if they should be very old whins, it might perhaps be better to cut them off entirely at the roots; but whins of a young growth may be formed into fences in the manner I have described, having done some myself, and found it at once easy and practicable.

I have observed in this neighbourhood, on a farm called Broad Oak, belonging to the Duke of Northumberland, where excellent fences might have been formed from the whins that were growing upon the land, and of strength sufficient to have formed a fence, but which were burnt and destroyed, and other hedges made of dead materials and young quicks at a very great expence, which are continually wanting repairs, and perhaps in a few years are smothered again by whins.

I have before said that whin fences would be very beneficial, the annual clippings of the whins being eagerly sought after by the poor inhabitants round the forest as food for their horses, mules, and cows; of this fact we had a strong instance, for, before the hedges were cut, we could not keep the people out of the enclosures, cropping the young whins in every direction for the support of their stock; but when the strong species was introduced on the banks, they preferred it to the smaller native furze, gorse, or whin, and would even buy it from the woodmen if it was cut in the winter season.

At first we cut it in the summer, but this may be done at any season of the year with safety; and when it can be converted to the support of stock, it may be as well to cut it in the winter months. The shoots of one year's growth are always used, and are prepared by putting them in a large wooden trough, and chopping them small with something like a mole-catcher's spade, only longer and heavier, and about six or seven pounds weight. It is a very nutritive food, especially for horses, as it makes them sleek and kind with their dry winter's food; it is also reckoned excellent for producing milk, much in quantity and fine in quality, many poor people keeping a cow, and a horse or two, with scarce any other food.

Chopping the whin by the hand is both laborious and tedious; and I was induced to try if a thrashing machine would answer the purpose, but I soon found it would not. No doubt, however, need be entertained but instruments may be made to crush or bruise it; perhaps something like a forge-hammer would answer the purpose. I have heard of mills to bruise it, but have never seen one; however it would be a very cheap and nutritive food, if an easy method could be contrived to bruise it. Horses would soon learn to eat it by mixing it with their corn, and perhaps it would be the best way of giving it them, when one half or one third of the corn would suffice; but if given with their corn, it would require chopping small; if it was well bruised to crush the spines and thick stalks, they would eat it like hay. Some kinds of land would produce more profitable food from whins than from any other state of cultivation, as might be easily conceived by only observing the thick sappy shoots of the whins, from a foot to eighteen inches in length, compared with the burnt-up herbage, moss, or scanty crops of corn, if such land is under cultivation, besides the additional extent of surface from the bushes being raised like hillocks.

From what has been said, and proved from experience, there appears only one conclusion, viz. to convert the annual shoots of the whins into a very useful food for horses, cows, and sheep, which is a cheap and easy method of preparing it for them. Then the annual clippings of the whin fences, in situations where sheep or other cattle cannot go to browse on them, may be turned to the greatest advantage. The knowledge of their usefulness might be of the most essential service, as well to the farmer in high and hilly situations and severe seasons when fodder is scarce and dear, as to the mining districts in Durham and other parts of the kingdom. Having seen and proved their efficacy, I have advanced nothing upon this head of mere theory or speculation.

By experience we found that the banks stood and answered the purpose as well by reducing the dimensions to 4 feet wide at the bottom, 4 feet 6 inches high, and to about 18 inches wide at the top, putting one entire good thick turf at the top, or rounding it a little with good soil to keep the wet out of the inside in moist situations, to sow the seeds in, and to prevent them falling too deep between the turfs. The seeds should be sown in a shallow drill along the middle of the banks, as soon after the bank is made as possible, as they vegetate and grow much better when the soil is fresh, and the whins get up before the grass or weeds; this is worth attending to, for we found a material difference in the practice. The walls were made of as flat stones as could be procured, without mortar, 5 feet high, with a good turf laid along the top to keep out the wet and hold them together. Both the banks and walls generally gave way, under the shock of heavy and long continued rains, except the stones were of a very durable quality and well put together. The earthen banks with the whin hedge answered better, as we found much disappointment and great extra expence from stone that appeared quite hard and good when dug out of the quarry, but, when it came to be exposed to the action of the atmosphere for some time, it crumbled away very fast, and occasioned such breaches in the walls as could not be repaired without dragging stones from a great distance, or substituting some other kind of fence. The quality of the stones should therefore be well ascertained before they are put in the walls, or heavy loss must inevitably ensue.

Since I have been at Chopwell, I have made a very durable dead hedge on the top of a bank to project outwards, similar to those in the forest for the protection of the whin hedges on the banks, with short larch stakes drove in the bank about 9 inches apart, and slightly bound with long slender black thorns; and as both the larch and black thorns are very durable, it will last a long time, and answer exactly the same as it did in the forest, to keep out strong cattle and sheep, which never got over after it was made, although they were hungry at the time, and could not be kept out before with the common hedge. Short larch stakes, about 2 or 2½ feet long, are sufficient. The tops of the larches will do. I have likewise made some similar fences with larches, leaving the side branches on, shortened to about 6 or 9 inches in length, driving them in the bank so as the side-spurs touch each other; and as the larch is so durable, and the wood becomes very hard when dried, it will answer the same end.

This is the best and cheapest fence I

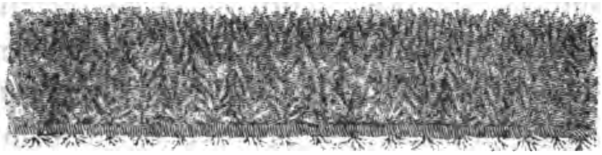
have yet seen, to protect the bottoms of hedges from the browsing of sheep and cattle; and, by projecting outwards a little, it gives both room and light for the lower branches to grow and fill up; and from being in that position, it prevents the cattle from reaching over to browse, as the sharp ends of the sprags or stakes come in contact with their throats, and will not give way the same as when they are in an upright position; the lower branches can never grow and expand when stuffed full and close at the bottom with dead browse, which causes hedges to be naked and open at the bottom.

But, to secure a good and permanent fence in the forest, and to guard against all unforeseen circumstances, we planted a row of quicks on a raised bank, about 18 inches high, in the insides of the worst parts of the bank and walls, and afterwards extended it to the greater part of the banks, and where the stones appeared of a bad quality in the walls; in short, nothing was left undone that appeared necessary to insure the raising up a new forest of oaks.

I have dwelt longer on the subject of fencing than I at first thought I should have had occasion to do; but as there are great quantities of land in these kingdoms, in very high situations, which would grow timber very well, and as we often hear of the remains of trees having been found where there is no living vestige of a tree to be seen at present, and where, it is thought by some, trees will not thrive on account of the cold and bad soil.

As the expence of enclosing is a very material objection in such situations, and want of proper materials at hand, I was induced to dwell more at large on the nature of fencing, and to suggest my ideas to obviate the difficulties by pointing out a cheap and easy way of enclosing such land.

The earthen banks I have been speaking of appear to me to furnish the most likely means for enclosing such land, as being at once the cheapest and best; and if there should be no wood at hand to protect the young whin hedge, heath or broom may be substituted under the uppermost turf, as I have frequently seen round the rabbit warrens in some parts of Lincolnshire; but if the whin is strong enough to adhere to the soil, it is the better, as the ends of the materials, reaching into or past the middle of the bank, may prevent the whin hedge from thriving; and there are, I suppose, but few situations where some of these kinds are not to be met with. But whatever material may be used to protect the young whin, it must be so placed that cattle cannot reach to crop it till it becomes a fence.



This plate is a sketch of a hedge of whins upon a low bank, or on the even ground, as may be required; but it will, by clipping it annually, become so thick that a bird cannot pass through it, much less hares, rabbits, poultry, &c. Would not this kind of fence look well, and make a pleasing variety? To protect clumps of trees, flowers, single trees, or for other purposes in open lawns or parks, or for the protection of flower or kitchen gardens, when the whin hedge (or it may be termed an evergreen wall decorated with flowers) is in flower, it looks very beautiful; and, being an ever-green, it has a good effect in the winter months; besides the warmth and shelter it affords, it would be very ornamental, and is sooner established than any other hedge whatever.

From its hardiness, quick growth, and adaptation to any soil or situation, there is no fear of its being choaked, if kept clean at first, and nothing suffered to grow against it to exclude the light. On the outsides there is little danger; but in the inside there may, without this knowledge and precaution. It may be useful to remark, when it is wished to see it in flower, that the clipping may be omitted till it is out of flower.

The workmen's prices, for making the earthen banks in the forest, were from 2s. 6d. to 3s. per rod; and the cutting, preparing, and making the dead hedge to protect the whins, 1s. per rod. The walls were generally made for 8s. per rod, including every thing, such as getting the stones, and wheeling, if necessary, a reasonable distance. The prices the fences were contracted for were, the walls at 9s. per rod of 18 feet, the earthen banks at 4s. per rod, statute measure, 16½ feet, and to be kept in repair for three years, except in cases of wilful damage.

The drains were at first made only 15 inches wide at top, 12 inches deep, and very numerous; but this method was soon found not to answer, as most of the drains, (except the main or carrying drains, which had a good descent,) soon choaked up, and did more harm than good, owing to the grass so soon growing in them, and by the soil thrown into them by the moles in crossing them. The great expence incurred in looking over and cleaning them out, induced me to think of a cheaper and more effectual method. Accordingly, we had them made both deeper and wider, from 2 feet 6 inches to 3 feet 6 inches wide at the top, and from 15 inches to 2 feet and 2½ feet deep, and about 10 inches or the breadth of a spade wide at the bottom. By enlarging the dimensions, fewer became necessary; consequently they could be sooner gone over, and cleaned out at a great deal less expence.

The carrying or main drains are those which convey the water from the cross drains, which, if they have a good descent, need not be made deep, as they will soon wash deep enough. The cross drains should have a tolerably good descent into the others, to clear themselves in heavy rains of any leaves, loose soil, &c. that may be likely to choak them up.

As to the necessity or utility of having the ground properly drained before it is planted, I need say nothing; of that every person of judgment can form a proper opinion; and as to the manner of doing it, the whole depends so much upon local situation, nature of the soil, and other circumstances, that it must be left entirely to practical experience.

CHAP. II.

On planting the Acorn, Seedling, and larger Plants.—Causes of the Failure of the Acorns and Seedlings.—Remarks and Observations thereon.

The plan of fencing and draining being now completed, it will be time to think of planting.—The original contract with Messrs Driver was to have the land holed at 4 feet apart each way, the holes to be 15 inches square and 9 inches deep, turning the soil upside down previously to paring off the turf, and laying it to one side; except every tenth hole, which was to be 18 inches square with the turf taken off, and 12 inches deep; to plant in every tenth hole a strong five-year-old oak, and in every hundredth hole a five-year-old Spanish chesnut; the rest of the holes to be planted with a sound perfect acorn, except on such parts as should be deemed unfit for the growth of oak; these places to be planted with ash, elm, beech, or sycamore, with the fir and pine tribes.

But, preferring the four first specified sorts to the fir and pine, where the ground should be thought fit for the growth of such trees, each vacancy that may happen to be made good for three years after it was first planted, with a plant of the respective kinds.

Plants and acorns were accordingly provided and planted, and the holes made agreeable to the contract; but, after three years trial, we were obliged to desist, and substitute one year's seedling oaks.

After counting the plants from the acorns (the first year after planting them) in 9000 holes in various places in the different enclosures, we never found more than 40 plants in 100 holes from the acorns, and in some only 3 or 4 plants in 100 holes. On an average of those counted there appeared about 24 in every 100 holes, or little more than one fifth, though the greatest care was taken to plant and mend over each hole with a sound good acorn; but the acorns were taken out by the short-tailed field mouse, rooks, and other vermin. After being mended over with fresh acorns a season or two, it was no better; the plants still went off, from various causes which I shall hereafter describe; and, in some of the holes where the water lodged, the acorns rotted.

After we had ceased planting acorns, we continued to plant one year's seedling oaks in lieu of acorns, the large plants in every tenth hole the first time over, and to mend over the second year with two years' seedling oaks; in some cases we missed one year, and made good all failures with a strong three-year-old oak the last time over.

In some parts of the enclosure, where the plants from the acorns and seedlings had so failed, and the furze, grass, &c. had become so strong before they were finally mended over, and finding it of no use to do so with seedlings, it was agreed to mend all over for the last time with strong four-year-old oaks, about 150 to an acre, to plant that quantity according to the number of acres such enclosure contained, but to plant them on the barest places, as some parts were sufficiently stocked with what had been planted and what came naturally, this quantity being considered quite sufficient to stock the enclosure according to the spirit of Mr Driver's contract.

On finding how fast the fern, furze, grass, and such shrubs as birch, broom, &c. increased after the enclosures were shut in, and the impossibility of procuring five-year-old plants so fast as they were wanted to plant such vast tracts of land so soon as it was got ready, rather than defer such a duty a year or two till the plants arrived at that age and size (because size was a material object) it was agreed to plant strong and good three and four-year-old oaks, instead of the five-year oaks, in every tenth hole, while the holes could be distinguished, or we must have planted it with seedlings, and left the tenth hole unplanted for a year or two, which could not have been so regularly filled up with large plants afterwards.

The Forest of Dean is a hilly district, some of the hills of considerable elevation, with flat and low grounds between them. On some parts of the most lofty hills we planted fir, ash, elm, sycamore, with the oak and Spanish chesnut interspersed amongst them, which succeeded very well indeed on the dry ground; but where the soil was wet they did not succeed at first, although the ground was drained; but as the turf was taken off about an inch or an inch and a half thick with the mattock or holing instrument, it left the hole when the soil had settled that depth below the surface of the unstirred ground; when of a retentive nature, the holes were full of water all the winter, and when we came to plant in the spring with the mixture of plants, we could not fasten them, as the soil was like a puddle, and the first high wind that came would loosen the plants.

When the dry weather set in, the soil would become hard and crack, and expose the roots to the dry cutting frosty winds that generally prevail at that season of the year; if planted in the early part of the season it was worse, as the frost in that case would heave them out of the ground, and expose the roots to the sun and winds; of course, what were not killed made but little progress, nay, were scarcely kept alive. This was the case in all the wet ground planted with nothing but oak, as well as those planted with the mixture of trees. The wind had not so much effect upon the oak and other deciduous kinds, as it had upon the evergreen firs; but the seedlings, that were planted in the early part of the season, were thrown out by thousands in all the wet parts of the ground.

Something however must be done to obviate this and other difficulties, or all the labour and expence would be thrown away, besides the disagreeable feeling arising from the failure of attempts so earnestly made. On this principle I suggested to the commissioners the idea of raising the holes for the plants above the original surface, to throw off the wet from the roots; a plan of which they approved, and which they ordered to be done, by taking a spade-full of good earth from the dry ground to each hole; but this I soon found to be both tedious and expensive, and not affording soil sufficient to answer the purpose. I then suggested another method, which was as instantly adopted, which answered a two-fold purpose, and succeeded beyond my most sanguine expectations, being of much importance in all wet land, particularly where the fir and pine tribes were planted.

Instead of holing the ground where it had not been previously holed, the lines were laid down, as usual, at 4 feet apart, a good turf 16 or 18 inches square, as thick as the soil would admit, from 7 to 9 inches, laid with the grass-side downwards, at 4 feet apart each way where the holes would have been made.

The turfs were cut in rows, to communicate with the drains; one row thus cut will raise the holes for about three rows of plants, which, if properly done, will carry off the water into the drains; some of them may be made into drains at a trifling expence. Thus the raising of the holes and draining the ground were done at nearly one expence, and by this method the ground is left a great deal drier, no water being capable of settling about the roots of the plants, affording at the same time a stratum of soil as thick again as the original; and, by being laid down a few months before planting, the two swards rot, and the sod becomes firmly fixed, so that they can be planted with the greatest ease without disturbing the sod; part of the roots will also be just within the original surface, and the rich soil, produced by the rotting of the two swards, affords a fine pabulum for the roots of the plants during the two first years, when they stand in so much need of it, preventing also their being loosened and thrown out of the ground by the frosts or winds, as the soil about the roots is always dry and kindly, the same as if planted in the driest soils.

The effects were indeed so great, that I could safely recommend the plan to be acted upon in all wet ground, as it can be done with nearly the same expence as draining, the plants thriving exceedingly well, and the other advantages almost incalculable.

Mr Driver's men holed the soil in the common way, only not so deep as before laying on the sods; but I do not think this mode necessary, as it is attended with more trouble and expence, and robs the plant of part of the rich soil, by removing the turf where the hole and plant are to be.—I had several acres done in the way I have recommended for large five-year-old oaks, which was attended with the greatest success, without the loss of scarce a plant, the whole taking to the soil, and thriving in an extraordinary degree.

Before we fell upon this plan, the plants where it had been planted on such cold wet lands, particularly where the fir tribe were planted, had failed, and we raised all such holes with a large square turf, planting it over again, and the effects were astonishing. Another benefit attending it was, the plants were not so soon encroached upon by the grass, &c.

The raising of oak woods from planting, or sowing the acorn in the place it is to remain till the tree comes to maturity, has been a favourite theory with speculative men for ages. The plan has been tried upon an extensive scale in his Majesty's Forest of Dean, and in the New Forest in Hampshire, which latter was begun to be planted about the same time as Dean Forest, and some other smaller forests belonging to the Crown in different parts of the kingdom.

Whether the acorns were tried in any of the other forests, I do not know; but as the experiment was made upon such an extensive scale in these two principal forests, and being found impracticable, I flatter myself I may render some service, or at least some information, to those persons who may still entertain the opinion, or who think the oak will make a tree sooner or better from the acorn than a transplanted oak, by pointing out the reasons of that method failing of its objects in his Majesty's Forests, and the probability, or rather certainty, of a transplanted oak making a tree as large or larger, and in less time, than a tree from the acorn, sown or planted in the place where it is intended finally to remain.

I have before stated, that the short-tailed or field mouse, the rooks, and various vermin, took the acorns out of the holes, and caused a great deficiency in the plants at first coming up; but of the destructive ravages of that little animal, the field mouse, I was not so well aware till two years after I had been in the Forest, and the third from the commencement of planting it with acorns. In making my survey of the state of the enclosures and plants for the information of the commissioners, I had frequently observed great quantities of the small oak plants from the acorn having been barked and bitten off, particularly where the grass was thick; and nearly all the ash that had been planted in the wet and moist grounds (for some ash had been planted in those situations) were barked all round the stem in the same manner as the oaks, only more so, as they seemed to be fonder of the ash than the oak bark. We all thought it was the hares that did the mischief, although at that time there were very few hares in the plantations; but still we found vast quantities barked and bitten off, and always so near to the ground, about 5 or 6 inches high.

In the Autumn of 1812 that circumstance struck me forcibly, so much so, that I was induced to examine more minutely; when I was not a little surprised to find, at almost every plant so barked or nibbled, great quantities of very small dung, much less than hare's dung, but something similar in its appearance; I thought of course it must be the field mouse, which we soon found too true.

Having before observed, where the grass and other herbage were thick and rank the plants were chiefly barked, but where the stem of the plant stood clear of herbage of any kind, the plants were scarce ever touched; this is worthy of remark, and very natural, for without shelter they would have been more exposed to their natural enemies the hawk, owl, &c. and, like most other mischief, it must be done in the dark. Some of the small seedlings were barked all round the stem, as high as the mice could reach; others only in part, but much nibbled, and great quantities bitten off, and as the plants were destitute of leaves, and the rank grass getting above them and excluding the light, the greater part were soon killed, wherever the grass or other herbage was rank.

Before the Autumn of 1813 the mice had become so numerous, that we could pick up four or five plants of the larger or five-year-old oaks on a very small space of ground, all bitten off, just within the ground, between the roots and the stem; and not only were the oak and ash injured, but the elm, sycamore, and Spanish chesnut, of which the mice are not so fond as of the two former.

Of the hollies that had been cut down great quantities of young shoots had sprung up from the stools, were looking very well, and making a fine shelter, as we thought at the time, perhaps thirty or forty shoots from a stool or old root; these were nearly all destroyed in one winter, by the mice barking them in the very same manner as the oak and ash; nor did the crabs, willows, nor even the strong shoots of the furze, escape their ravages; they appeared to feed very much on the young shoots of the furze or whin; and I have seen hollies, as thick as a man's leg, barked all round, and as high in the bush as 4 or 5 feet from the ground. This was in some thick bushes, where were plenty of leaves and old stumps to shelter them when at their mischievous work. The willows were barked every branch, to the height of 3 or 4 feet from the ground, when they grew in thick shelter of any kind.

In fact the grass, in some of the small encroachments from the Forest in the occupation of the inhabitants, was very much destroyed by them, particularly the seeds or artificial grasses, and the people were frequently remarking how their crops of hay suffered from the depredations of the mice. Indeed, if I had not seen it, I should not have thought it possible.—The long grass in the enclosures, when it got laid after completing its Summer's growth, in which state it smothered, and helped, with the mice, to destroy the plants, looked like a riddle, comparatively speaking.

The mice had now become so numerous and destructive, that, when Lord Glenbervie was in the Forest in the Autumn of 1813, he became so alarmed about the final success of raising a forest, that he soon after wrote a letter to the deputy-surveyor, instructing him to pursue every means we could think of, by cats, dogs, owls, poison, traps, or any method that could be devised, even to cutting up all the grass and fog by the roots, offering a reward at the same time to any one that could find out the most effectual way of destroying them. No expence was to be an obstacle, even if the cost was more than had been expended on the enclosing, holing, and planting; so anxious was his Lordship for the success of the undertaking!

Operations were immediately commenced, with traps, baits of various kinds, with poison, and with dogs and cats, but all with little success, so extensive are the plantations.—At length a person hit upon a very simple, and, eventually, a very efficacious mode. Having, in digging a hole in the ground some time previous, observed that a mouse or mice had got in and could not get out again, the idea was suggested to him, that, by digging holes of a similar form, he might succeed. He tried accordingly, and found it to answer.

The holes for catching the mice were made from 18 inches to 2 feet long, 16 or 18 inches deep, about 10 inches or the breadth of a spade at the top, 14 or 15 inches wide at the bottom, and 3 or 4 inches longer at the bottom than the top. If the ground was firm, the better; some holes were made in a circular form, but this was only a work of fancy, which cost more trouble than the oblong holes, as either sort answered, provided they were well made, the sides firm and even, and 3 or 4 inches wider every way at the bottom than at the top, otherwise the mice would run up the sides and get out again, if they could find any footing. But, if well made, when they were once in they could not get out again; and, what is very extraordinary, they would really eat each other when left long in the holes!

Most of the mice were caught in the latter end of the year, and, what is rather singular, in the course of a wet or stormy night we always caught the greatest quantity; on the contrary, in calm, dry, or frosty nights, very few entered the holes; but, generally, most were caught when the holes were fresh made. Baits of various kinds were put in the holes to draw them, but without any visible effect, as the holes without the baits caught full as many; what attracted them in we could never tell, whether the smell of the fresh earth, or what other cause, we could only conjecture. We have taken 15 in a hole in one night. Sometimes the holes were made in the drains, where there was not a constant run of water, as the mice appeared to run along the drains, and a great many were caught in those holes.

The people who made the holes of course looked after the mice, and were paid for them by the dozen. They were obliged to attend to the holes, to take them out very early in the mornings, otherwise the crows, magpies, hawks, owls, weasels, and other vermin, attended very regularly, and made the first seizure.—Several of these depredators were caught in the fact, the men dropping on them so suddenly, that great quantities were taken out and never accounted for. We soon caught upwards of thirty thousand, that were paid for by number, as a person or two were appointed to take an account of them and see them buried, or made away with, to prevent imposition.

The holes for the mice were made at 20 yards apart each way, over a surface of about 3200 acres.—In the beginning of 1814, was a heavy fall of snow, which, it is very probable, must have destroyed great quantities of them; for, with what were caught and killed by the different ways, added to the severe and long-continued storm, but little damage was done by them for two or three years afterwards.

And here I cannot but admire the goodness of that Almighty Providence that watcheth over all his works, and "from seeming evil still educing good," for these severe winters seem to have had the effect of destroying and keeping under various of those noxious tribes of animals or insects, that would otherwise render most of our field labours vain and useless, were there no other means of checking their increase and progress but what we poor puny mortals know or possess!

Since I have been at Chopwell, previous to the great snow in 1823, the mice were pretty numerous, and had done considerable damage, by biting off several very large oaks; and though after that winter I found none for two years, yet I perceived they were again increasing.

It is said by naturalists, that the beaver will fell trees with his teeth; but I have never seen an account of mice felling oak trees, yet have I found oak trees cut down by them of 7 and 8 feet high, and an inch and half in diameter at the place bitten off, which was just at the root, as before noticed. When examining for the thick part of the root below where it was bitten off, I could never find any part of it left, so that it is very probable it must have been eaten by them; but whether this sort of food was softer or more palatable than the part exposed to the atmosphere, I cannot tell; perhaps Sir H. Davy, or some other able chemist, with a proper apparatus, could ascertain the fact.

I have by me at this time several of the large plants, before described, that were bitten off by the mice, and among them a large beech, for the inspection of any gentleman or naturalist, who may be desirous of witnessing, with his own eyes, the wonderful power of so diminutive a creature as the mouse in felling trees.

Ants I also found very destructive enemies to plants wherever they abounded, which they unfortunately did on many parts of that old uncultivated land in the forest; for the ant hillocks, on some parts, were very numerous, and on such parts the plants were sure to be killed, or never throve or made any growth. The roots, when examined, appeared cankered and unhealthy, and to the smell were something like fetid fungus.

Whether the ants extracted the juices from the roots only, or from both roots and stems, I do not know; but the plants never throve where the ants were, but died away in a few years. Even the whins sown on the banks for the fences, whenever the ants got into the banks at the roots of the whins, the plants were sure to be killed, and we had to dig out soil and ants all together, and supply fresh soil, seeds, or plants, before we could get them to grow.

To destroy the ants, we opened their hillocks in the depth of winter; and throwing all the inside of those hillocks about in the frost and snow, appeared to me the cheapest and surest way to destroy them. Great quantities of plants were lost by the ravages of these insects.

Another cause of such small plants being destroyed was by the frosts heaving them out in all the wet and clayey ground; even the five-year-old oaks and chesnuts were thrown out, and I was under the necessity of having some turf put round each large plant in such wet holes at the time of planting them, (before we adopted the plan of raising the holes) which proved a great preventive of the plants being so thrown out by the frost.—But, as the seedlings were planted by the dibble or setting stick, we were obliged to leave them to their fate; such ground, however, we generally left till towards March, and planted all the dry ground in the early part of the season; but even this was attended with an extra expence to the contractor, by having to go over part of the ground, and to the same places, twice; but, after the plan of raising the holes was adopted, we could plant all kinds of land at any season.

Great quantities often died, owing to the frosts that so frequently happen in the Spring and Summer months. After the plants come into leaf, being so low and on a level, or rather below the level, of the grass and fog, the old dead grass is termed *fog in the forest;* the frost has such an effect upon the plants below the level of that fog, that frequently the young shoots and leaves of the small plants have been killed by it, when the plants of 3 or 4 feet high, and that stood above it, have not been injured at all, except in the lower branches among the fern, grass, &c. When newly planted trees lose their leaves at that time, before they have made any roots, they are very apt to be killed; indeed they hardly ever recover. This is assuredly a strong reason against small plants being planted in low moist situations, or where the herbage is rank and strong. I have seen the same effects upon the higher ground, but not so common.

In the nurseries in the same enclosures, and on the same elevation, which were kept clean from grass and weeds, the small plants were not injured at all by the same frosts that killed the young shoots and leaves of the plants among the fog and grass; this, I should think, affords a good hint to keep the nurseries of tender plants entirely free from weeds and grass.

As the oak is a long time in most situations before it establishes itself in the ground, to be able to make a vigorous shoot, and to cope with the rank grass, fern, &c. small plants have but a poor chance to succeed. Wherever the land is rich, the plants will make an effort in the Spring months, if not destroyed by frosts, to make a few leaves to keep them alive; but before the end of Summer, when they should make the autumnal shoot, the grass, fern, or other herbage, has got quite over them, the grass falls down upon them, kills the leaves and the young shoots, and affords a fine shelter for the mice to finish them; and where strong fern abounds, it falls down with the first heavy snow, and does the same business for them as the grass and other herbage.

If any plant should escape the first year, the next Spring the remaining plants will make fresh efforts to produce leaves and branches, but the same effects ensue with increased means, as the grass, fern, &c.

get stronger and taller every year; and the plants weaker, till they finally die.

This became so serious in the Forest, that we were obliged to have the grass cleared from the plants for several years, and a sum of upwards of £1900 was paid to Mr Driver, during his contract, for clearing the grass from the small plants, to prevent them being smothered. This is a serious expence if it can be avoided, which in a great measure it may, by substituting larger plants. Very large sums were also expended for cutting the fern in the enclosures; for after he had fulfilled his contract, the sum of upwards of £264 was paid in one season for cutting fern, to save the plants from being killed by it.

What was paid in other seasons I cannot tell, as I have not the accounts; but it must have been very considerable, as it was obliged to be followed up for several years. Fern gathers strength very fast, if it is neglected to be cut; and will soon get, where it is sheltered, to 6 or 7 feet high; and when such a mass falls down upon small plants, what chance have they ever to get up again, if it is not cut from them? Cutting it in July or August weakens it very much, or after it is got out of the curl, that is when all the lobes of the leaves are fully expanded, and before or about the time it has done growing, as it is then in a succulent state and bleeds, which perhaps weakens it; if it is cut too soon, it will require going over again the same season, which occasions a greater expence, and does not appear to weaken it more than that which was cut in July; and if it is left till late in the season, it will not weaken it for another.

In four of the enclosures, which contained about 1700 acres, we estimated that 200,000 of the five-year-old oaks that were planted had been destroyed by the mice, besides the immense quantities from the acorns and seedlings. Mr Driver charged for 300,000 plants destroyed by mice in those four enclosures, besides what were destroyed from the same cause in others where no estimate or charge was made.

From the foregoing facts it will appear, that the experiment of raising a forest of oak from acorns, planted where they were intended to remain to become timber without being transplanted, was fairly tried, upon an extensive scale, and has completely failed. Nearly the same failure, I understood, occured in the New Forest as in Dean Forest, and about the same time.

Some persons have imagined that such plants would make better trees and sooner; but this I believe is an opinon without facts to support it. A great deal is also said about an oak having a tap-root, and the injury it sustains by breaking it in transplanting; but have not most other trees a tap-root when raised from the seed? And as a tree increases in size from the multiplicity of its leaves and branches (as I shall hereafter show from actual experiment) consequently it must derive some good from the multiplicity of its roots. By shortening the main root, the tree is disposed to throw out a greater number of strong roots in every direction, to seek, as it were, after nutriment, if indeed the roots do take in all or part of the nutriment to support the tree, or to assist the leaves in their functions; and as to the tap-root penetrating into soils and rocks for nutriment, those lateral roots may be easily supposed to do the same offices as the tap-root. Then, instead of one tap-root, you have, perhaps, half a dozen or more main roots, in every direction, seeking food, which I presume must tend to increase the tree faster than only one main root.

But oak trees are known to grow to as great a size and as good timber, where the roots cannot penetrate deep into the earth from the under stratum; as I have seen them upon a sandy under stratum, upon very poor soils, or rocks that lay in horizontal layers, and upon hard grit and sand stones, where the roots have been found to run along the surface of the rocks with scarce any soil at all; yet this timber was reckoned as good, and perhaps better, than that which grew in the richest soils, or where it is supposed to derive its support, by the roots, from some unknown depths and causes in the earth or rocks.

But when we see forest-trees arrive to nearly the same perfection on lands with under strata of qualities of opposite extremes, does it not appear probable that the trees must be supplied with nutriment from some other source than their roots, or else why talk of the goodness or qualities of soils for forest-trees ?

I have somewhere seen an account which states, that the mahogany trees, which grow to such an immense size, frequently thrive upon bare rocks only, their roots penetrating into the clefts of the rock ; but of the nature of those rocks my information did not state ; and as the rains are periodical in those climates, or perhaps but little rain at all, it might be asked, how are such immense trees supplied with nutriment to increase to that amazing size ? Surely not by the few roots in the clefts of the rocks ; but not having ever been in those countries, I must leave this subject to those who have better opportunities to ascertain and pursue the inquiry further.

The large fir trees in Sweden and Nor-way, it is well understood, thrive upon a very thin sandy soil, on barren rocks; as does also the Scotch fir, upon sands near the sea coast, where nothing else would grow. These trees arrive to a vast bulk, but not, I should suppose, from what they can derive by their roots from the barren rocks and sands. To me, therefore, it appears almost conclusive that some kinds of forest-trees, if not all, must derive their nutriment by their leaves, which perhaps are peculiarly adapted by nature to absorb more or less of the different gases that are afloat in the atmosphere, according to their different natures, and which have been proved to be absorbed by vegetables, and to be the food of plants; because it appears very probable, that different plants are formed with different organs or leaves to draw in and modify their food, which causes that endless variety we see in the vegetable kingdom, both in flowers and fruits; and we see nothing resembling leaves on the roots of trees, nor is it probable there can be the variety of gases in the earth and rocks as in the atmosphere to constitute that variety.—Might not the gases be more abundant in some situations than in others? Does any gas arise from the sea, and is it from thence carried to the adjacent land, for the support of vegetation? It seems very probable that such are amongst the other wonderful operations of nature.

We often hear of the existence of forests, where no living vestige of a forest at present remains. If such places were enclosed and planted with Scotch, larch, or any of the fir tribe that would grow in those situations, added to the annual decay of the leaves of the firs or other trees that may be planted in them, with the decay of the leaves of such vegetables as the warmth of the plantations would increase; all these causes might produce gas for the support of the living plants, and perhaps even the trees might arrest it in its progress through the air from places where it is produced in abundance, but where plants are not sufficiently numerous to consume it.

It appears to me very probable, that

the reason why the Spring and autumnal months are more unhealthy than the depth of Winter, in frost and snow, is, that the decay of vegetable, gaseous, and other matter, which produces the noxious vapour, is more rapid at those seasons than in the Winter; and as the leaves of trees are past performing their functions in the autumnal months, and in the Spring are not enough advanced to absorb the superabundant noxious gases that are produced and afloat in the air at those seasons, is the cause, I think, that those periods are generally the most sickly; and perhaps those noxious and deadly vapours, which we read of as prevailing in the deserts of Africa and some other countries in the torrid zone, may arise principally from the want of a sufficient vegetation to absorb them.

But to return to my subject. The soil is not of such consequence to forest-trees as is generally thought, if we can only get firs to grow; oaks, I believe, and other deciduous trees, would grow equally well or better after they were established in the ground, and, by taking out the firs gradually, fine woods of oak and other timber may be raised in almost any situation in these kingdoms.

I have seen many instances of fine oak, elm, ash, sycamore, and other trees, which were healthy and vigorous in very exposed and bleak situations, but which, perhaps, would never have been raised without the aid of the fir tribe at first. When the firs were turning mossy, and seemed to be getting into a sickly stunted state, and were nearly done growing, these trees, where they had not been stunted and injured by the firs in their infancy, appeared to have had room to grow from the first.

I would always plant the deciduous trees at the same time as the fir tribe, that the firs may not get the lead of them too much, and as the oak and other trees are so much longer before they begin to grow. On all the slopes or steeps of the hills in the Forest the oaks did not appear to require any shelter, as they grew very well with the natural shelter of the hill and what under-growth there was; but in the plains and on the tops of hills they required shelter, and the fir tribe seems best adapted of any for that purpose, if properly managed and taken out in time, otherwise they are the worst enemies. The growth of oaks is astonishing when sheltered a little in their infancy, and till they are large enough to shelter each other.

In the lower or moist situations shelter for the oaks is equally necessary, and perhaps more so, to protect them from the frosts that injure them in the Spring and Autumn while in a growing state, when their shoots are extremely tender. I have frequently seen the young shoots, in such situations, killed three or four times through the Spring and Autumn months, although some tall fine trees were never touched, that were above the fog, as the damp atmosphere which rises in such situations mounts only to certain heights, and which causes the frost to act so upon the tender vegetables or young shoots of trees.

In one low damp situation, planted in 1809 with oak and Spanish chesnuts, and where the land was very good, we were, in 1818, under the necessity of planting firs in all the open parts to nurse them up, as the plants were continually kept in a stunted shabby state, from the frequent frosts that happened while the plants were making their young shoots. In the open parts, where there was no shelter, the plants were only from about 3 to 4 or 5 feet high in all that time; whereas, just above the level of that damp atmosphere on the rising grounds, the plants were 10 or 12 feet high, as were also some in the same level where they happened to be sheltered by alders or other undergrowth.

Without shelter, I believe, in those low situations, oaks and chesnuts would hardly ever get up, unless the plants were 10 or 12 feet high when planted, which might readily be done with success in those deep and rich soils, if plants were properly raised in a nursery for them, but not so soon from the natural or those taken out of woods, with only one tap-root and few or no side-branches upon them.

I have had opportunities of observing the beneficial effects arising from the shelter afforded by the firs to the oaks and chesnuts, in two or three low and wet places in one of the enclosures, where some firs had been planted among the oaks, before we adopted the plan of filling up with firs the low ground I have been speaking of.

The alder is a good nurse in those situations, if the ground is very wet, and the water remains in it most of the Winter; but as it is a very spreading tree, the branches should be shortened, in the manner I shall hereafter describe, when they may be left to grow till the oaks are 10 or 12 feet high, and till the alders will be fit for pit props, glass posts, or any other purpose they can be put to at that size; if the branches are not shortened, they spread and overtop the oaks, and prevent them getting up, so that the remedy is worse than the disease.

I am inclined to think the firs arrest and check the frosts better than the alders; I therefore would prefer them;

but, to insure their growth, the land must be well drained, and the places intended to be planted should be raised above the level of the surface, in the manner I have described before. As the firs, particularly the larch, will not thrive, nay, will scarcely live, where the water lodges in the soil all the Winter, the branches of the firs must be shortened, to prevent them from injuring and over-topping the oaks or other wood, when they may be suffered to grow as nurses till the oaks are 12 or 14 feet high, at which time the nurses should be all removed, not all at once, but gradually, when they will leave a fine wood of most valuable timber.

From the foregoing observations it will appear, that there can be no general rule for the size of plants, as that must depend upon local circumstances and peculiar situations. Upon all high and poor lands, where the grass or other herbage is not strong, nor likely to become so after it is enclosed, strong plants, from 12 to 18 inches or 2 feet, are the best size. In land of a richer quality, that abounds with more and stronger herbage; plants of 4 or 5 years growth, and from 2½ to 3 or 3½ feet high, ought to be planted; and in very low rich soils, abounding with strong rank herbage, plants of a larger growth (excepting the fir tribe) should be planted, and not small plants indiscriminately, as is generally the case when planted on contract by nursery-men. Gentlemen are apt to suppose nursery-men understand more of planting than others; but perhaps this is not a safe rule to be guided by, for it is not impossible but self-interest may sometimes influence their opinions and recommendations. They may understand very well how to raise and manage plants in a nursery, but when they come to be taken out and planted in such opposite extremes of soils and situations, with their after-management, I much question whether their knowledge is entirely to be depended upon, or is superior to that of others who may have had more practical knowledge.

By planting very small plants in such situations, a great loss of plants is frequently the case, as also the loss of time, which is of much greater consequence, when the plants do not live or thrive properly; besides the great additional expence in clearing them from the rubbish, which would inevitably destroy or injure them; on these accounts the grass, weeds, or whatever else may present an obstacle to the growth, should be carefully cut away, or beat down from the plants. If the plants are strong and large, they are easily seen, will not so soon be overtopped, and but little time need be lost in looking for the plants among the rubbish. A person may clear three or four large plants while he is looking for one of the small ones, which must make a material difference in the expence, besides allowing more time to do the work in before the herbage, whatever it may be, attains its full growth; and, generally, such work cannot be done all at once, but gradually, as the people employed get accustomed to it; nor is it so well to set fresh hands on, nor should very old people be employed, when their sight begins to fail them, for they may soon do more harm than good.

Having seen such baneful effects from the neglect and erroneous management of plantations in the first periods of their growth, I shall endeavour to point out more fully the ruinous and almost remediless consequences of such neglect and mismanagement, and the benefit and pleasure that may be derived from the contrary practice.

To shew more fully the difficulties that occurred in planting the Forest, from the failure of plants by the various causes before enumerated, I should have stated that, after Mr Driver had finally completed his contract by planting and mending over all failures for three years in each enclosure, we had provided, in the different nurseries in the Forest, to fill up such vacancies as might afterwards occur, and to plant some more land that had been purchased and attached to the Forest for growing navy timber.

In the year 1818 there were growing, in the different nurseries for the aforesaid purposes, 4,039,000 oaks, and 888,000 plants of other kinds, viz. firs of sorts, ash, elm, Spanish chesnut, &c. making a total of 4,927,000 plants; and, by a statement made to the commissioners in October 1821, the vacancies were at that time very extensive, as the plants wanted to complete the enclosures in Dean Forest were 2,985,000; to complete the enclosures, not to plant fresh ones, 2,000,000 of which were planted the following season, and the rest as soon as the plants arrived at a proper size. This was four years after the last of the enclosures had been completed according to the contract.

These facts should operate as a caution to gentlemen who form plantations, to plant, at first, proper sized plants according to different circumstances, to insure the success of the first planted trees as much as possible, by taking every precaution to prevent them from being destroyed or injured afterwards, as every filling up is attended with a heavy expence, besides the loss of time, which is the greatest loss in the growth of plantations, and should be avoided as much as possible.

In the thinning of plantations, where the plants are too thick, it may be desirable sometimes to take up a few trees of a large size to make a small plantation as quick as possible, to hide some particular object, for clumps or single trees in parks, lawns, &c. or filling up open spaces in older plantations, woods, &c.

It may not be amiss to state an experiment that had been tried in the Forest, and which was attended with great success.

In planting out large oaks or other trees, if care is taken to get them up with good roots, replant them with care, and to thin out some of the branches and cut the others in, if the plants should have many branches, or to cut off their tops at from 10 to 12 or 13 feet from the ground, according to the height and strength of the plant to be removed, they will generally succeed very well. This method might be very desirable, and useful in many cases, where oaks are too crowded, by taking some out, and planting them in such places, where small plants would be smothered or injured by the causes before pointed out.

An experiment of this kind had been tried in the Forest some years ago. About five acres of land had been enclosed and sown with acorns; and at various times since, when the plants were from 12 to 14 or 16 feet high, and so strong as to support their own weight and stand upright, many have been taken out and planted in the open or uninclosed parts of the Forest, over about fifty acres, and fenced round with rough thorns to protect them from the cattle. These have succeeded amazingly well, and are now in as healthy and vigorous a state as can be imagined or wished. Of those that had been planted out the first, some appeared to have had their heads or tops cut off at from about 10 to 15 feet high, and the others to have been left with their heads or tops on. Part of those, with their heads left on, look very well, and are making side branches; but, in in general, those that have had their tops cut off at their removal, are by far the best plants, and are more disposed to throw out strong branches, to form crooks, knees, &c. than the others, and they begin to grow much sooner; because large plants, when removed, if they are not well cut in, pruned, or divested of a great part of their branches, are much longer before they make fresh shoots, if ever they do; as probably the bark, sap, and air vessels get hide-bound and contracted for want of their usual supply and circulation of nutriment, and will remain in a weak and sickly state for years, or till it kills them, if they are not relieved by cutting all or part of the branches off; when they will soon make fresh and vigorous shoots, if that operation has not been too long delayed. This must be evident to practical planters, and must strongly evince the utility of cutting off the head of a stunted hide-bound plant, pruning the branches in, or by slitting the bark up the stem. Any or all of these operations will be of the greatest benefit to save the tree, accelerate its health, and quicken its growth; but this is particularly applicable to transplanted and stunted fruit-trees.

After the heads are cut off, and the plants make fresh shoots for a new head, it then requires a little care and skill to select the best, placed so as to cover the wound made by cutting off its head to heal over, or to cut off the head to where the best shoots are emitted from the stem, as they may happen to be below where it was cut off, which would cause an unsightly stump, or leave a wound when that stump decays, which may injure the timber, if it should be a thick tree cut off.

When oaks have been drawn up weak and tall, without any side branches, among other trees, which is frequently the case, the best method I believe to be adopted with them, after the others have been taken out, would be to head them down at different heights, when they might be formed with a little art and care into the most beautiful and useful trees; whereas, when they are left in that state, they hardly ever come to any thing, and are a continual eye-sore.

These observations will apply to all

trees planted out large for ornament, hasty shelter, skreens, blinds, &c. in parks, lawns, or near the mansions of country gentlemen, by which means the object of the planter might be accomplished much sooner than by planting small plants from nurseries; it would also be the means of preserving many a choice and valuable tree, which the proprietor would feel much reluctance in cutting away, although it was injuring another of more value which might be removed into fresh situations, where it would be of great use in much less time than small young plants.

A person skilled in the art of pruning, as gardeners are or ought to be, would do a great deal in forming these newly planted trees, either for profit or ornament, or those that have been drawn up weak and their tops cut off, as they ought not to be left to chance after that operation, or to the management of ignorant persons who have never studied or known the nature of pruning, &c. but proprietors should study to know the nature of these things themselves, as they are always the most interested, or should be; and then they would take a pride and pleasure in such laudable and useful pursuits, and would be able to give proper directions, and to judge when the work was skilfully performed, which it is chiefly the design of this work to inculcate.

CHAP. III.

Plantations of mixed Trees, shewing how they are accelerated or retarded in their Growth by different Modes of Treatment; with a Table of Experimental Facts to prove it.

CHOPWELL PLANTATIONS.

Having completed the planting of the Forest according to Mr Driver's contract, the commissioners thought it right to remove me into the county of Durham, to superintend the planting of some lands belonging to the Crown for the production of navy timber, and to have the charge of that and some that had been planted about six years before.

The land intended to be planted was arable, worn out by bad cultivation, with some old woody and boggy land, to the extent of nearly 900 acres; about one half had been planted in 1813, 1814, and 1815, the other in 1820 and 1821, The original contract with Mr Falla was to plant the ground one half larch, one quarter oak, the other quarter with ash, elm, beech, sycamore, and alder, and to be mended over for three years afterwards where the plants should fail.

The larch and alder took to the soil immediately, and grew very rapidly; but the oak, ash, elm, &c. took but slowly, as those kinds are several years before they so take to the soil as to make any progress, particularly the oak, some of them from 1 to 6, others from 7 to 8 years, before they begin to grow.

When I first came to Chopwell, in the Autumn of 1819, I made a survey of the plantations, and stated my opinion, in a report to the commissioners, on several subjects relating to the plantations, of which they were pleased to express their approval, and ordered me to write, for their information, a monthly report of the state of the fences, drains, enclosures, and plants, of the works executed and going forward, together with such remarks and observations as might, in my opinion, be beneficial to the plantations, similar to what I had been accustomed to do from Dean Forest.

I made, accordingly, another careful survey of the grounds that had been planted; and was astonished to find, in some of the fields, scarce any thing but larch and alder, with very few oaks or other wood to be seen. I have counted 14 or 15 larches in a row all together, at 4 feet apart, or larch and alder mixed; and well knowing that oak timber was the grand object of the Crown in planting forests, I was not a little surprised in coming from the Forest where nothing scarce at first were planted but oaks, as the larch and alder had taken to grow very rapidly from the first; and being planted so very thick, the branches had met and united close together, and the grass and other weeds had become so rank and high that the oaks were nearly smothered, and, quite dwindling, would not bear their own weight when the grass or weeds were cut or pressed from them. In the mending over, great quantities of larch had been put in where the small oaks and other plants were among the grass, and could not be easily seen at that season, when they are divested of leaves, so that the plantations appeared to have nothing but larches in them, as several of the oaks must have been destroyed in the mending over, and the larch was very frequently planted close by an oak or an elm.

Finding them in this state, I represented to the commissioners, that if oaks were the principal object, there appeared, in my opinion, to be too many larches planted, and there were great wide hedge rows from 20 to 30 feet wide, besides other places not planted. I recommended a nursery of young oaks, with some Spanish chesnuts, as I conceived they would grow here, although there were very few in the country, and I was told they would not thrive in this cold climate. I also recommended some ash to plant by the side of the drains, and in rich moist places, with some elms, and a few Scotch and spruce firs, for particular situations; the spruce chiefly, with a few silver firs, for some deep rich bogs, where I conceived they would grow to a great size; but my chief object was, the nursery of oaks, to fill up the deficiencies which I foresaw would occur when the larches were taken out. These suggestions were acknowledged and approved of by the commissioners, the nursery ordered to be made, and plants procured according to my recommendation.

Respecting there being too many larches, they approved of what I had suggested, and said they would take it into consideration against the next planting season, as it was too late to alter it for the present.—Accordingly, at the next planting season, when there were about 180 acres to plant, they directed an alteration in the mode of planting, ordering only one fourth larch instead of one half, as before, and one half oaks, the other fourth a mixture as at first.

I found, when I first came, that the people who had the management of these plantations had commenced what they called pruning the larches, by cutting off all the lower branches close to the stem, to about 4 or 5 feet from the ground, as is the common practice with numerous gentlemen who have plantations; but observing that the branches met, or soon would, at the top, and by excluding the light from the few oaks there were, and these in so weak and dwindled a state, the very best of them only from about a foot to a yard high, and the larches from 12 to 15 or 18 feet high, I was certain the oak, elm, and ash, could not grow under that shade, any more than where the branches had not been cut, and over-topped the oaks, and other hard-wood.* Besides the very great expence in going over all the larches in that manner, by cutting the branches off close to the stem, without doing any good whatever to the oaks and other plants, as I knew the larches must not be there long if there were any oaks to be raised for a forest.

I was struck with the idea that, by shortening the branches of the larches or alders, to admit light and room to grow, wherever there was an oak, ash, or elm, which I considered of more value than a larch or alder, and that it would turn to profit after the larches were taken out; and though at that time I was not aware of the real value of the larches, and the various uses they could be converted to at so young a growth, nor that there would be a demand for them; but I knew they were planted for a secondary object, as nurses to the oaks.—I considered them as the best of nurses for that purpose, in a moderate proportion, if not suffered to overlay and smother their charge, if I may be allowed the simile; for there are few persons who would like to have their favourite and hopeful heir overlaid and smothered by a sleepy nurse, nor leave him too long in her charge; so it is with the young oaks, which may be justly considered as the favourites and heirs of the forest.

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* All kinds of wood, but the fir and pine tribes, are termed *hard-wood* in this country; how proper the distinction, I shall not at present inquire.

Much good, I thought, might be done to the oaks by shortening the branches of the larches, alders, or any other thing that impeded the growth of the oaks, and that by this method the larches might be suffered to grow longer before they were taken out, and turn to more profit by being larger before they were cut; that the expence would be but little compared with the advantage, that a deal of ground might be gone over in a little time by shortening the branches where the plants of more value were growing, and on that side only which encroached upon such plants.

My plan was approved of, and I received orders to proceed with the work in that manner; at the same time I was directed to sell and turn every thing that I could to the best advantage, towards lessening the expence; particularly some whins of a very extraordinary size, of which we were clearing the ground about to be planted.

But to return to the larches, which had been planted only seven years; in July, 1820, we commenced relieving the young oaks, ashes, elms, and beeches, where there were any, from the over-growth of the larches, according to the orders I had received. The sycamore, or plane tree as it is called in the north, I considered of no value as a nurse; and, if suffered to grow, the very worst enemy to the oak. I got some hooks made with a handle about a yard long, and the bill about a foot long and bent a little, such as is used in Scotland for cutting hedges instead of shears, with one hand back-handed. Wherever we found an oak, ash, or elm, we shortened the branches from the larch on the side that encroached upon the oak, or other plants to be relieved, from a foot to 2 feet from the stem of the larch; or, if the plant was very near, we cut the branches closer to the stem, or according to the distance the plant was from the larch, shortening the branches, as high as the men could reach with the hooks, with a quick stroke downwards to make a clear cut; copying nature, to keep the upper branches the shortest; the longer to admit light to the other plants, which I considered of the most essential use to their growth. When the larches were too high to reach with the hook, the men bent down the larches that were not too strong with one hand, and shortened the uppermost branches with the other; if there were larches on every side the oak, and near to it, then of course we shortened the branches all round it; and if there was a plant to be relieved on each side of a larch, the branches were shortened on two sides of the larch. It but seldom happened that a larch had the branches shortened all round.

The oaks at this time were very languid and weak, where the land was good and herbage rank. When performing this work I ordered the men to clear the grass from about the plants, to beat it down with the hand or hook, and to look carefully for them, as but few could be seen without close examination; at the same time shortening any of the strong shoots a little, and where they grew forked with two or more shoots, to shorten all in, except the best for a leader, and not too close to the stem; but in this I had a good deal of trouble to overcome, as they all thought they knew very well how it should be done, particularly as to the pruning, and each, no doubt, thought his own way the best; at length I persuaded them not to shorten them so near to the stem, nor to cut any off close to the stem.

It will be well to bear in mind the size and condition of the oaks at that time, (1820) and the sixth and seventh year after they had been planted, to contrast it with their appearance and size at this time (1824.) In the beginning of September following I was astonished to see the improvement the oaks had made, both as to strength and appearance, having got several young vigorous shoots from the sides, and where the branches had been shortened; I had the elm, ash, and beech shortened in the same manner where they stood in need, leaving the straightest and best shoot for a leader.

In some of the fields the larch had suffered considerably from the blight, or from that white glutinous matter which so frequently gets on them in the Spring and Summer, from the frosts or other causes, and were in a very unhealthy, sickly state; part of the branches were killed by it. When the branches were shortened in, it gave them a very naked appearance; but as the oaks were the grand object to be considered, and by that cause they got more light, and the larches being only a secondary object, I thought but little about it; in fact, I thought it a benefit to the other plants, till it was affirmed that I had spoiled the larches, and that they bled by cutting them in that manner; but knowing from experience that no plants would bleed, if cut when in a growing state, except the vine, which bleeds more than any plant when cut in the Spring, and before it comes into leaf; but leave it till it is in full leaf, and it may be pruned as much as may be into the old wood, and no bleeding of any account ensues, the ascending sap being conveyed into the young shoots immediately.

However, as I found so much was said, by several people of *supposed knowledge*, that the larches were spoiled by shortening the branches, and which blame was attached to me, I was induced to ascertain, by actual experiments, whether the larches were injured by that operation or not.—I accordingly measured several larches, some with the branches shortened in the manner described, others with the branches left entire or not cut at all, and some with the branches cut off close to the stem to about 4 or 5 feet from the ground, and as nearly of the same thickness, height, and size, in the same soil, and as near together as possible, to make it as fair a trial as I possibly could.

I was afterwards induced to try further experiments of the same nature upon more larches, oaks, elms, &c. to ascertain by facts the best method as to pruning, bringing trees to the greatest size and profit in the shortest period, and to contrast the difference between taking proper care of plantations in their infancy, or neglecting and leaving them to chance in that most important period of their growth; which I hope I shall be able to prove beyond a doubt by actual experiments and facts.

Before the end of the second Summer, the astonishing effects of these experiments were very visible both in the oaks and the larches; wherever the pruning hook had been, the larches had shot out numerous young vigorous shoots, even where the larches had been so blighted and injured, that several of the blighted ones died from its effects. It was truly surprising to see the healthy and vigorous shoots they had made on that side of the trees that had been shortened, when contrasted with the other side that had not been cut in, or with those trees that had not been cut at all. Where a larch had happened to have the branches cut in all round, it gave it a remarkably healthy appearance, by its numerous young vigorous branches full of leaves, when contrasted with the sickly blighted state of its neighbour.

When it was discovered that the larches had not bled to death by the operation of shortening the branches, it was thought they were injured by the numerous and vigorous young shoots which would draw the sap from the stem of the tree, weaken it, and spread and do more harm to the oaks than if not cut at all. The absurdity of draining the sap from the stem of the tree, so as to injure or prevent its increasing in bulk, I believe I need not point out to any man of common experience in the vegetable world; as any one, who observes a tree in its natural state, will see that, the more leaves and branches there are on it, the thicker the stem. Observe only the trees on the outsides of woods, where they have more leaves and branches than in situations where they are crowded in the interior of the plantations. Except the tree is suffered to run all to branches, which will be the case if it has room to spread, and is not checked by shortening those branches in, which prevents them extending too far from the stem; but in every case the stem will be thicker in proportion to the number of branches and leaves below where those branches unite with the main stem.

Shortening their branches, before they extend too far from the stem, causes a greater number of smaller branches and leaves near the stem ; checks the great currency of sap into those branches, at least prevents them from becoming large ones; and makes it to ascend and descend in greater quantities in the main stem, and increases it in substance, as the tree advances in height, and makes fresh branches higher up ; those branches at the bottom grow but little thicker, but continue to draw in nutriment by the leaves till the tree is advanced to a great size, when they of course dwindle and die away, without leaving any of those great knots and blemishes occasioned by the decay and breaking off of large branches from the stems of timber trees. Or the branches might be cut off close to the stem, when the tree has advanced and made branches sufficient, above the height it may be desirable to have a clean straight stem.

But to return to the subject of the experiments.—I have drawn out a table of some of the principal ones, among numerous others, which will shew how trees are increased in size and how retarded, with the increase in each year, and how that may be more or less in different years from accidental causes; and a pretty correct judgment may be formed how large a size a tree may grow to in a given time, particularly if the experiments were continued for a few more years, upon oaks, elms, and other kinds of trees. The larches have been pretty well ascertained in the four years I have carried on the experiments.

A TABLE OF EXPERIMENTS,

(Divided into Inches and Eighths of Inches)

Upon the growth of several kinds of Forest Trees, in girt, &c. to ascertain the utility and best method of pruning, and other management to promote their growth.

No	Kinds of Trees.	How pruned, &c.	Girt May 1821.	Girt Nov. 1822.	Increase.	Girt Nov. 1823.	Increase.	Girt Nov. 1824.	Increase.	Total Increase in 4 years
		First Division.								
1	Larch	Branches entire … … … at 3ft. 0in.	9 3	13 4	4 1	15 7	2 3	17 7	2 0	8 4
2	Do.	do. shortened … … … … at 3 0	9 3	14 6	5 3	17 1	2 3	19 2	2 1	9 7
3	Do.	do. cut off close to the stem to about 5ft. … } at 3 0	8 6	11 3	2 3	12 7	1 4	14 4	1 5	5 6
		Second Division.								
1	Do.	Branches cut close to 5ft. … at 4 0	6 3	7 5	1 2	8 5	1 0	9 6	1 1	3 3
2	Do.	do. entire … … … … … at 4 0	6 4	9 4	3 0	11 6	2 2	13 7	2 1	7 3
		Third Division.								In 2 yrs.
1	Do.	Branches shortened … … at 3 0		8 7		10 2	1 3	11 7	1 5	3 0
2	Do.	do entire … … … … … at 3 0		8 7		10 2	1 3	11 3	1 1	2 4
		Fourth Division.								
1	Do.	Branches shortened … … at 2 10		3 4		5 1	1 5	6 4	1 3	3 0
2	Do.	Branches thinned out, where very numerous } at 2 10		4 0		4 6	0 6	5 2	0 4	1 2

No.	Kinds of Trees.	How pruned, &c.		Girt Nov. 1822.	Girt Nov. 1823.	Increase.	Girt Nov. 1824.	Increase.	Total Increase in 2 years
		Fifth Division.							
1	Do.	Branches few	3ft. 0in.	3 2	3 7	0 5	4 0	0 1	0 6
2	Do.	do. do.	3 0	3 4	4 1	0 5	4 1	0 0	0 5
3	Do.	do. more numerous	3 0		6 1		7 0	0 7	0 7
4	do. *tall*	do. but few	3 6	7 2	8 0	0 6	8 3	0 3	1 1
5	Do.	do. more numerous & shortened	3 6	6 7	8 5	1 6	9 4	0 7	2 5
6	Do.	do. entire	2 0	4 3	5 2	0 7	6 2	1 0	1 7
7	Do.	do. thinned	2 0	4 3	4 7	0 4	4 7	0 0	0 4
		Sixth Division.							
1	Do.	do. shortened .... at	3 0	6 6	8 4	1 6	10 1	1 5	3 3
2	Do.	do. entire ... ... at	3 0	6 4	8 5	2 1	9 3	0 6	2 7
3	Do.	do. shortened ... ... at	3 0	6 1	7 4	1 3	8 4	1 0	2 3
4	Do.	do. entire ... ... at	3 0	7 5	9 4	1 7	11 6	2 2	4 1
		Seventh Division.							
1	Do.	do. entire ... ... at	3 0	11 1	13 2	2 1	14 7	1 5	3 6
2	Do.	do. shortened ... ... at	3 0	11 0	13 0	2 0	14 3	1 3	3 3
3	Do.	do. thinned ... ... at	3 3	5 3	6 1	0 6	6 5	0 4	1 2
4	Do.	do. shortened ... ... at	3 3	5 3	6 7	1 4	7 5	0 6	2 2
5	Do.	do. cut close to 5ft. ... ... at	0 23	7 0	7 2	0 2	8 0	0 6	1 0
6	Do.	do. shortened .. .. at	0 23	7 0	8 1	1 1	9 1	1 0	2 1

No	Kinds of Trees.	How pruned, &c.			Girt Nov. 1822.		Girt Nov. 1823.		Increase.		Girt Nov. 1824.		Increase.		Total Increase in 2 years	
		Eighth Division.														
1	Larch	Branches shortened … …	at 3ft.	0in.	9	5	11	4	1	7	13	0	1	4	3	3
2	Do.	do. entire … … … … …	at 3	0	9	5	11	2	1	5	12	2	1	0	2	5
3	Do.	do. cut close to 5ft. … …	at 3	0	9	5	10	4	0	7	11	2	0	6	1	5
		Ninth Division.														
1	Do.	do. entire … … … … …	at 1	6	3	2	4	7	1	5	6	7	2	0	3	5
2	Do.	do. thinned … … … …	at 1	6	3	2	4	4	1	2	5	7	1	3	2	5
3	Do.	do. shortened … … … …	at 1	6	3	2	4	7	1	5	6	3	1	4	3	1
4	Do.	do. cut close to 2ft. … …	at 1	6	3	2	4	4	1	2	5	4	1	0	2	2
		Tenth Division.														
1	Do.	do. shortened … … … …	at 3	0	7	0	8	6	1	6	9	5	0	7	2	5
2	Do.	do. entire … … … … …	at 3	0	7	0	8	2	1	2	9	1	0	7	2	1
		Eleventh Division.														
1	Do.	do. entire … … … … …	at 3	0	6	1	7	4	1	3	8	2	0	6	2	1
2	Do.	do. shortened … … … …	at 3	0	5	6	6	7	1	1	7	5	0	6	1	7
		Twelfth Division.														
1	Oak	do. entire and shortened …	at 2	0	5	0	7	0	2	0	8	1	1	1	3	1
1	Do.	do. do. … … … … … …	at 4	0	3	6	5	2	1	4	6	4	1	2	2	6
2	Do.	do. do. … … … … … …	at 3	0	5	0	6	3	1	3	7	3	1	0	2	3
3	Do.	do. do. … … … … … …	at 3	0	3	1	4	3	1	2	5	2	0	7	2	1

No	Kinds of Trees.	How pruned, &c.	Girt, 1822.	Girt, 1823.	Increase.	Girt, 1824.	Increase.	Total Increase in 2 years
		Twelfth Division continued.						
4	Oak	Branches entire numerous ... at 1ft. 6in.	5 0	6 0	1 0	7 0	1 0	2 0
5	Do.	do. entire do. ... ... at 1 6	3 2	4 5	1 3	6 0	1 3	2 6
6	Do.	do. entire ... ... at 0 3	3 2	4 4	1 2	5 5	1 1	2 3
7	Do.	do. thinned out ... ... at 0 3	3 2	3 7	0 5	4 2	0 3	1 0
8	Do.	do. thinned out ... ... at 0 3	3 0	3 6	0 6	4 2	0 4	1 2
9	Do.	do. thinned out ... ... at 2 6	2 6	3 0	0 2	3 2	0 2	0 4
10	Do.	do. shortened and numerous at 2 6	3 0	3 7	0 7	4 4	0 5	1 4
		Thirteenth Division.						In 1 year.
1	Do.	do. shortened ... ... at 3 0		6 7		8 0		1 1
2	Do.	do. do. ... ... at 3 0		8 1		9 0		0 7
2	Do.	do. do. ... ... at 3 0		6 0		7 1		1 1
		Fourteenth Division.						
1	Elm	do. pruned ... ... at 3 0		7 4		8 7		1 3
1	Do.	do. do. ... ... at 3 0		9 7		11 1		1 2
1	Do.	do. do. ... ... at 3 0		10 0		11 3		1 3
		Fifteenth Division.						
1	Ash	planted in 1813 or 1814 ... at 3 0				8 6		
1	Do.	do. ... ... at 3 0				7 5		
		Sixteenth Division.						
1	Beech	planted same time ... ... at 3 0				7 4		

The first 3 larches, in the first division, with the branches entire, as will be seen by the table, have increased 2 inches and an eighth of an inch in girt each year, for four years on an average; the second, with the branches shortened, has increased 2 inches and nearly 4 eighths each year on an average; while the tree, with the branches cut off close to the stem to 4 or 5 feet, has only increased 1 inch and 3 eighths, or a little more, in each year.

The trees, in each division, grew in the same field, the same soil, and as near together as I could get them, as I wished to have the experiments as complete and exact as posssible.

Nos. 1 and 2, in the second division, are remarkable, and shew the difference very clearly of the two modes; between cutting the branches off close to the stem, and leaving them to nature at full length. The tree, with the branches cut off, had a little the advantage of the best soil in this case. The tree, with the branches cut off close, it will be seen by the table, has increased in girt only 3 inches and 3 eighths in 4 years; whereas the tree, with the branches entire, has increased 7 inches 3 eighths in the four years, making one inch each year more than the other; an object, surely, well worth attending to!

In the third division the tree, with the branches shortened, has increased half an inch in girt more than the tree with the branches entire.

In the fourth division are two trees measured, the one with the branches shortened in all round, and the other with part of the branches taken out close to the stem, to shew the difference of the increase between trees with numerous, or with only a few branches on, let it arise from what cause it may. The plants so circumstanced were nearly alike in every respect; it will be seen that the one with the branches shortened has more than doubled the other in two years growth, having increased 1 inch and 6 eighths more than the other.

In the fifth division the trees were not so healthy and vigorous as in some of the other fields, having been blighted and injured by whins and birch growing among them, and other causes; but the experiments are demonstrative of the fact, that trees with numerous branches increase faster than those with only a few branches, or in a sickly state, as will be seen by referring to the table. Some of them have not increased any thing in girt the last year, the branches being few, and the leaves sickly, all the Summer, as the larches were more blighted this year (1824) than the preceding one.

The tree, No. 4, marked *tall* in this division, is about 18 or 19 feet high, stands clear of any other, and much exposed; which proves that, by divesting trees of their branches, they may be grown as tall and slender when standing singly as when crowded close together, and have lost their leaves for want of light, although they might have had plenty of branches. This fact shews why trees, crowded together, cannot increase in bulk for want of leaves and branches.

No. 5, in the same division, is about 15 feet high, with branches more numerous.

I shall pass over some of the other divisions without any remark.

In division 9 it will be seen that a larch, planted in 1820, has increased in girt the last year 2 inches, nearly as much as the trees in the first division of 11 years growth, and 19 inches in girt. It appears curious that a tree, of 4 years growth from the time of planting, grows in thickness as much or nearly as a larger and older tree! Might we not judge nearly at the age of a healthy tree from its being first planted, when we find by an average of years how much it will increase in girt yearly, allowing for casualties, from seasons, or other accidental causes, according to situations and kinds of trees? This may be a proper subject to ascertain by experiments upon different trees for a number of years.

In division 8 are three trees of the same size when measured, which will shew the difference strongly of the different modes of pruning larches, if it may be called pruning.

In divisions 12 and 13 are experiments

upon several oaks, with numerous branches; others with few branches upon them thinned out and cut off close, similar to the larches; those with entire branches had the strongest shortened a little in the manner I have before described, to cause them to produce more small branches and leaves, and not to grow long straggling branches with but few leaves upon them. By these experiments it will be seen what vast advantage the oak and larch with many branches and leaves have over those with but few branches, by the increase in girt each year in such small young plants; the largest increase in girt in one year, at 2 feet from the ground, appears to be 2 inches; at 3 feet, 1 inch, 4 eighths, or an inch and a half; and 1 inch 3 eighths, 1 inch 2 eighths, and 1 inch in girt; whereas those with the branches thinned out are but few. Nos. 7, 8, 9, in this division, have not increased near so much; which, I should think, would convince any unprejudiced person of the utility of leaves and branches in a healthy state upon trees, and of the error, in very common practice, of cutting all the lower side shoots close off from young trees, where pruning, as it is called, is practised.—Nos. 7, 8, 9, though so small in girt, are as tall, and have as much room, and as good soil, as any of the others.

In divisions 13, 14, and 15, is shewn the size of oaks, elms, and ash, planted in 1813 and 1814, I mean in the Spring of those years, as the planting generally commences in the latter end of the preceding years. There are oaks from 7 to 9 inches in girt at 3 feet from the ground, and only 11 and 12 years from being planted, and were small plants, and have increased above an inch in girt the last year; elms planted at the same time are at 3 feet from the ground, from 8½ to nearly 11½ inches in girt, with an increase the last year of an inch and 3 eighths; and ash of the same years planting, from 6 to 7 and 8¾ inches in girt; also numerous oaks from 6 to 8 and 9 inches in girt, at 3 feet from the ground.

Now suppose these oaks to increase only an inch and a quarter for the next 8 years, (but it is very probable they will increase more, as the last year I did not think a very favourable one, and in one instance, No. 1, in the twelfth division, an oak the year before had increased at 3 feet an inch and half in girt) then there will be oaks from 18 to 20 inches in girt, ash of the same size, and elms from 20 inches to 2 feet or more; supposing the elms to increase only 1 inch 3 eighths each year, but it is probable they may exceed that.

These oaks are from 10 to 12 or 15 feet high, and strong, except those with few branches, which are as tall, and only half the girt.

Now, let any gentleman consider to himself, at having oaks, ash, and elms, of the sizes before stated at 20 years growth, from the time of planting them, after taking out a crop of larches; some of the ash and elms might be taken out much sooner, if they should be too near to injure an oak. The elms for pit props, and the ash for laths for crates, in the glass manufactories; but the ash tree is saleable for various purposes when of a small size; and the oaks of that size, (if they should be too close,) are useful for various purposes, besides the value of the bark, and having oaks at 20 years growth fit to thin out.

CHAP. IV.

On the profits arising from planting larches, as nurses to other trees.

I have before noticed that, by shortening the branches of the larches, they could be suffered to grow a longer period before they were taken out, with equal advantage to both the oaks and the larch, as has been shewn by the experiments.

As the larch and alder were planted so thick, and took to grow very fast from the first, they had got the ascendancy so much that they were injuring each other, by depriving each other of branches and leaves, and excluding the light from all the lower part; so that the plants were drawing up weak and slender, similar to having the branches entirely cut away, and getting so tall, that what oaks or other wood remained would soon have been entirely spoiled or dead; in fact, great part was dead, where the larches were so very thick, by the larches overtopping and keeping them continually in the shade. I believe I need not point out to any person, who makes any observation on these matters, what little chance small dwindling plants have to grow among larch and alder at 4 feet apart, and 15 or 20 feet high, and growing taller every year. There are a few places in these woods at this time, where the larches have not been thinned out; where the oaks are dead, or only about a foot high, with a few leaves, barely alive; let this be contrasted with the oaks I have been describing, and which are to be seen also. If these facts will not convince, I do not know what will.

The two first-planted farms contained 454 acres, about 100 of which were wood land, and wet bogs, growing alder, birch, and other wood peculiar to such land. The tenants had the pasturage of it, as it was all open to the arable land, the highest rent paid for it about the time it was planted, was £.220 per year; but, shortly after, it would have been reduced 25 per cent. the same as the other farms were in 1818 and 1819; this would have reduced the rental to £.157 per year, which, for the arable land alone, was not 10s per acre.

The larch and alder having been planted so very thick, it became necessary, in 1822, the ninth year after planting, to begin to thin some of them, particularly where they were stunted, or too near an oak or better plants. I was told I might cut them out, if they were too near or injuring an oak, without paying any regard to the circumstance whether they could be sold or not. However I thought it my duty, according to the instructions I had received, to try to make the best of every thing I should cut down; in which, I am happy to say, I was very fortunate. I accordingly began thinning some of the smallest and ill-shaped bad ones about the size of a hedge stake, and some still smaller about the size of a corf-rod, taking out those only that appeared to be injuring an oak, or were so crowded as to hurt each other, and which, if left, would never be much better, with the broken topped and crooked ones for hedge-stakes, and some a size larger for glass-posts, cutting out the bad alders and sycamores if too near an oak. There were often two plants together, owing to the mending over in the long grass, when the plants could not be seen; leaving all the largest and best, except they were close to an oak, to grow to a larger size for posts and rails or pit props till I could make more of them.

What I cut the first year (1822) as before observed, were of the smallest size and worst formed ones, and out of only a few fields I cut as many as I sold for £39. Having kept an account that year, I found, after all expences were paid, that I had cleared near £6, although it was the first year, and the men were strange to the work. A great deal of other stuff was cut down of no value, and much time lost in clearing the plants, cutting the side-branches off the larches, and carrying them to the roads. Cutting the branches from a larch is rather tedious, they being so very numerous, from their manner of growing on the tree.

In 1823, the second year of thinning, we thinned more out, as I found how I could dispose of them to the best advantage, thinning them so as to benefit the oaks, and turn them to the most profit; always keeping in mind the paramount object, the unbounded encouragement of the growth of the oak.

This year (1823) I sold as much larch and alder thinnings, with some birch and alder for pit-props that grew in some of the bogs, as amounted to £.232 11s. 6d. Corf-rods on a part of these two farms to £.45 6s. making a total of £.277 17s. 6d. I also sold, in the same year, larches of 10 years growth from being planted, for 6d. per tree upon the ground, down to a farthing for the smallest size, for training fruit trees to in nurseries, some of them as railing for fencing from 1½d. to 2d. and 3d. each, and a great quantity to the country people for spars or rafters for building, for which purpose they were found to answer very well. If one for about 6d. was too short or weak, I advised them to take two at 3d. each, equal or superior to the best at 6d., which, by splicing the two together, made a good spar or rafter from 12 to 15 feet long; by which means I disposed of a great quantity. The others, not straight or so well formed, were sold for pit props or posts for fencing, &c. and the tops of these for making crates for the glass and earthen manufactories, or hedge stakes, besides great quantities of the size of a good hedge stake, for a mode of fencing which was suggested to me by a neighbouring gentleman, which I adopted myself, and pointed out its advantages to others.—I was thus enabled to dispose of thousands which wanted taking out, and which would have been unsold or left to injure the others, by making room for them to grow faster for pit props and other purposes, and to clear the ground for filling up the vacancies with young oaks and chesnuts, which were provided and arriving at a proper size to plant out.

In 1824, the third year of thinning, I still became more fixed in my ideas about thinning the larches and alders, of disposing of them to the best advantage, both for the good of the oaks and making the most profit, by cutting out only the largest where I could possibly avoid it, in those fields where I had taken out the smallest previously; so that I was now reversing the system, for by taking out the largest that had arrived to the best size they ought to stand to grow, it gave more light to the oaks and other trees, and left the smaller larches longer time to increase in size and value, without injuring the oaks so much as the tallest were.

This year (1824) I had thinned out as much larch and alder, with some birch and alder, in part of the bogs, and corf-rods from only a part of these two farms, to the amount of £430, of corf and crate rods alone to the amount of £84, still leaving a quantity nearly as great for the ensuing year.—Thus it appears that, on the rough land alone, from corf and crate rods only is a profit of from 50 to £60 a year on an average; as these crops of corf rods, if properly managed, are cut away every third year, and can be divided into 3 cuttings, impeding but very little the growth of other timber when small, and none when the timber gets above them.—The thinnings from only a part of these farms have produced the sum of £.430, subtract the rental as reduced £157, leaving £273 more than the rental.

From these facts any gentleman may see that, by proper management, he might begin to derive advantage from his money expended in plantings, and taking care of them afterwards, for this must be attended to in 9 or 10 years from planting, and contrast this with the rental of these farms, that the land was so bad or ill managed that the farmers could scarce make a living upon them at that low rent, which was probably the cause of its being planted.

Not having any idea of writing upon this subject till very lately, I did not keep an account separately of the larch and alder thinned out on the arable land, and that had been actually planted from some that grew naturally in the bogs and woodland; but the greater part of both must have grown from the time it was planted, and the cattle kept out; nor of the expence of the work separately, except the first year, as a great deal of other work was going forward at the same time.

The first year of larch and alder from those that had been planted, were thinned to the amount of nearly £.40, the second year, as nearly as I can estimate, £.130, the third year £.250; and this upon only a part of the land under cultivation at the time it was planted, as a considerable part has had none thinned out at present.

CHAP. V.

Of the various uses to which larches might be applied at an early growth.—Of the gooseberry and currant plants, with remarks on the value of the wine to be produced from the fruits thereof.

Having shewn what profits might be derived from plantations at an early period, if taken proper care of and judiciously managed from their infancy, I shall endeavour to point out the various uses the larches may be applied to at an early growth, and at what size they ought to be taken out, if a permanent wood of oaks or other kinds of wood are required; and to enable gentlemen who plant, to judge of the proportion of larch to be planted, otherwise if larch or other firs are planted in the manner it was done here, viz. one half larch, at 4 feet apart, which is 1360 to an acre. But the larches, on a considerable part of this land, were thicker than that, owing to the mending over, as the small plants of oaks and other wood are not easily distinguished at that season among the long grass and other herbage, and the larch taking so freely to grow where the land was dry and suitable.

If they are planted as thick as these were, by not shortening the branches, or taking them out at an early age, would be the very destruction of the oaks or other wood; another year or two would have killed most of the oaks here. In some of the fields where the larch was so very thick, most of the oaks and other wood were destroyed, and we are now filling them up with fresh plants instead of having them the size I have shewn them to be in other parts where larch was not so thick, and where I had relieved them in the manner stated.—It appears that larches might be grown to suit a variety of purposes, and very thick upon the ground, if managed in the manner I shall hereafter describe; at present I will only point out the uses they have been put to here, and suggest other hints according to local circumstances, as far as my knowledge goes, for others to improve upon.

As the larch is, I presume, well known to be the most durable wood, cut at so early a period, of any we have in this country, I shall not dwell upon that part of the subject. We first cut out the smallest sizes, some only as thick as corf-rods; but that is an article not generally known, except perhaps in this part of the country. They are about as thick at the root end as the handle of a hay-rake, and, being straight and taper, are excellent stakes for nurserymen in training fruit or other trees to, being so durable from their resinous nature, that they will last twice or thrice as long as any other stakes or rods; they are more proper for the purpose than crooked or bent hazels. These have been sold at 1s. 3d. per bundle of fourscore, and fetched 10 miles from the plantations. Nurserymen would do well to attend to this circumstance, as those of that size, or a little less, would make excellent stakes in gentlemen's gardens for tying flowers to, greenhouse-plants, and various other purposes; as the root end will be in the ground, they will last a number of years by taking care of them, tying them in bundles, and laying them in the sheds; or, if left in the ground, those that cannot be taken up will last a number of years, and save the gardener a great deal of time and trouble, which is of vast importance to an industrious gardener, as it is thought they will last longer with the bark on than when peeled, particularly the part that is to be in the earth; the bark might be left upon the root end, and the other part peeled and painted, according to the taste or fancy of ladies and gentlemen, or the bark left on altogether.

A small quantity of ground near to a gentleman's garden, or to a nursery planted thick with larches, would afford a constant supply of handsome and durable stakes for a variety of purposes, for espaliers, or any other mode of training fruit-trees that require support, or for flowers, slender shrubs, or any occasion the gardener may require; they may be divested of their branches, made ready in rainy weather, and save a vast expence in the employment of carpenters to make them out of more valuable wood.

They are also useful for a method of training currant and gooseberry trees to, a method which I have adopted, and which is likely to answer several useful purposes. This I shall endeavour to point out, first by growing double or treble the quantity of fruit upon the same ground, of a larger size, and superior quality, by admitting the light and action of the sun's rays to all parts of the trees, and by preventing them from falling or lying on the ground when they are loaded with fruit in wet weather, and from blowing about in wind; besides, for the weak or trailing kinds of gooseberries, it raises and supports them from the ground, and produces a bearing tree of a good size in a great deal less time, with the fruit sufficiently raised from the soil, free from dirt in heavy rains, and easier and pleasanter to pick from the branches. By this plan any choice kinds for the table can be so easily protected with mats, which may be left open at the top to prevent them moulding, or with nets from birds, &c. to keep longer in the season, and they are far superior in flavour to those planted against north walls, and more free from filth of any kind; they have, besides, a most beautiful appearance.

Any lady or gentleman, who would wish to try a few trees upon this plan, would soon be convinced of the elegance of the effect, as well as the decided superiority of the fruit, in point of quantity, size, and flavour. I have only had them trained in this manner one year, but never did I see finer currants or better flavoured.

The gooseberries seem to answer as well; but, being the first year and the trees young, they had not so much fruit upon them; yet I have no doubt it will answer my most sanguine expectations by what I have seen this season. My method is, to drive about 7 stakes round the currant tree in a circular form at about a foot apart, and 14 or 15 inches from the stem; the larch stakes to be about 6 feet long, and the thickness of a good hedge-stake at the lower end, allowing a foot or

14 inches to be in the ground, which leaves about 5 feet above ground to train the branches to; then bend one shoot to each stake about 10 or 12 inches from the ground, and tye it with bass matting twisted, or with twine that has been tarred, and train a shoot on each side of the stake. I only trained one shoot to a stake at first; but I have, in most cases, trained two shoots, and I believe three may be made to answer, particularly on gooseberries, which have not so large a leaf as the currant. In Summer the stakes are entirely covered by the leaves, and the fruit hangs like straps of onions, comparatively speaking, equally exposed to the rays of light and heat, which give the flavour to fruit. The stakes must be let into the ground with an iron bar, and drove a little, as the larch stakes, being slender at top, will not bear much driving; a fire poker will do to make the holes for the stakes, in case no better thing is at hand.

Currant or gooseberry trees, of 3 or 4 years growth, may be trained to the stakes, but younger trees may be made more handsome and regular. My trees had been planted 4 years when the idea suggested itself to me.

I intend to leave some to grow 10 or 12 feet high for the currants, similar to the method of a hop yard; and this, it strikes me, would look very beautiful. Might not handsome arbours be made over the walks in a kitchen garden, by planting a row of currants or gooseberries on each side, intermixed or separate, according to fancy? I also think that a row of long taper larches might be set on each side of the walk, at about a foot apart, and bent to meet each other, so as to form an arch a little higher than a person's head when walking upright, high enough to allow a tall person to walk under conveniently, with two shoots trained one on each side of every stake; as the currant and gooseberry are quick growing plants, in about 3 or 4 years the branches would meet, and form a very beautiful and shady walk; while the pendulous bunches of currants of various colours, hanging down, would form a most pleasing spectacle.

Ladies and gentlemen might regale themselves in the shade with the finest flavoured fruit, fresh from the hand of Nature herself, without wasting any land; a circumstance which should be a consideration with those who boast of but little, or who pay very dearly for it.*

As currant wine possesses, according to Mr Brand's experiments, more spirit in a given quantity than most of the French wines, and nearly equal to port, and being of a higher nutritive quality, particularly the black currant, and the currant being an almost certain bearer, might not currant yards, or currant vineyards, be made, and great quantities of good and wholesome wine be produced in most families, who are so happy as to possess a tolerable garden or a little land? And how much more refreshing and cooling is a glass of cheap and native wine, or wine and water in the Summer months, to strong beer or foreign spirits? And as any family could readily make their own wine, with the addition of some sugar, they would be sure it was unadulterated; which must be a most gratifying reflection to many people, who have witnessed the filthy compounds too frequently on sale.

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* Since writing this I have tried some currants on the plan, and find it to answer my most sanguine expectations.

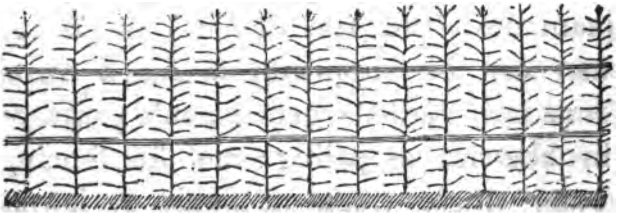
To persons in a poor state of health, and who, it is well known, loath any kind of animal food, how refreshing is a cup of this wine with a little dry toast! For myself, I have found it so useful in my own family, that had I currant wine from the black currant, or black and red mixed, I should not seek or desire port for people in a sickly state. What a gratification it must be, to persons of a benevolent disposition, to have wholesome and cheap wine to give to their sick and indigent neighbours, or to treat their female visitants, or others who might relish so humble but delicious a beverage! A small piece of ground would produce a sufficient stock of fruit to make a hogshead of wine; and I think it probable, were sugar reduced in price, that currant wine might be made cheaper than ale or cider; at least, a crop of currants would be more certain than a crop of apples; and, considering its superior strength, which is nearly double, it is cheaper than cider; besides, it might be made weaker when required, by mixing a little water with it when used; at any rate, currants can be grown with success in situations where apples and pears cannot; and currant wine can be made without any of those expensive but necessary utensils required in brewing, or making cider. Though a little foreign to my main subject, I shall here insert a receipt for making wine, such as is usually made and consumed in my own family:—

"The currants to be quite ripe and picked from the stalks, measured, and put into a large earthen vessel; to every quart of fruit put one quart of cold water, about half of the water at first, the fruit to be well bruised and pressed with the hands, then add the remainder of the water; let it stand till it ferments; keep stirring it once a day, to prevent it from becoming mouldy at top, for about a week; then strain it through a hair sieve, and squeeze the fruit well again through the hands to get out the juice; to every quart of the liquor put one pound of raw or moist sugar; stir it well together, till the sugar is dissolved in the liquor; let it stand, till it ferments again, for 4 or 5 days, and skim off the scum; then put it into the cask, but do not stop it too close till it has done fermenting; in about 6 months it will be fit for use, either to bottle off, or drink out of the cask from the lees; if bottles cannot be had, it is very good out of the cask, perhaps stronger than when bottled off from the lees; a little brandy may be added when bottled off, if thought necessary, but it is very good without."

Objections might be raised about the trouble of training currants this way, but that is very little (as ladies may recreate themselves with such innocent and useful employment) for currants, and the upright kinds of gooseberries, a person going over them 3 or 4 times through the growing season, to fasten the young shoots to the stakes, to prevent them being broken by the winds, will be sufficient. The trailing kinds of gooseberries will require going over a little oftener during the growing season, as they naturally incline to the earth after they are once trained to the stakes; a few ties with any durable stuff, will support them to each stake, and the larch stakes will last 7 or 8 years, and probably longer, before they decay at bottom; but having made no certain experiments to ascertain how long a larch stake of that size will last, I cannot be positive as to the time, but it is certain it will last longer than any other wood of the same age.

Having digressed from the subject a little, it is time I return again to it.—In taking out the larches when small, the worst formed ones, that are crooked and have lost their tops, will make good hedge-stakes, and being so durable and generally straight, they are preferable in many respects to stakes of other kinds of wood; some of the farmers would rather give 8d. per score for them, than put common sap wood stakes of birch, alder, &c. when they could have them for nothing, except the trouble of collecting and making them. I have sold great quantities of stakes for temporary hedges in turnip fields; they should be taken up and housed when not in use, and will last a number of years; but these stakes, as well as those for fruit-trees, being longer than common hedge-stakes and the tops small, must be put into the ground with an iron bar, as before observed, and close the earth well about them to keep them firm.

Another purpose to which they are applicable, and for which I have sold great quantities, (and the demand is greater than can be supplied,) is for a rural fence near gardens, gentlemen's parks, or shrubberries, as paling; and for fencing young single trees, in fields or lawns, from 4 to 6 and 7 feet long, and about the size of a good hedge-stake, according to the purposes for which they are wanted; but these must be larches that have not been injured by whins, broom, or any thing that has hurt or deprived them of side-shoots. By cutting the side branches off with a bill or hook, at a quick stroke, from the root towards the top, leaving a stump or spur from about an inch to an inch and a half the lower ones, and 2 to 3 inches the upper ones, all the length of the stake; by leaving the spurs longer at the smaller end than the thick end, the spurs touch each other from bottom to top, when nailed against the rails. The larches should be straight, and well furnished with spurs from the bottom to the top; if well done, it will appear thus:—



It will take about 9 in a yard, and will keep out poultry, dogs, cats, hares, and rabbits; it is the most handsome fence I have ever seen of the kind, and is much admired for its neatness and rural appearance, by numbers of ladies and gentlemen who have seen it, and has caused a very great demand for the larches to make it. It is well adapted for close paling round flower gardens, shrubberries, farmers' gardens, &c. to keep out hares, rabbits, poultry, &c. and for other paling round parks, and against young quick or any kind of hedge; as they will last while any quick hedge will become a fence, answer better than flat sawn or cloven paling, and look much neater.—The stakes being round, the shoots of the hedge or shrubs protrude through them more easily, and sooner covers them; whereas, when the shoots come against flat paling, they are stopped and turned sideways, and being closer, they exclude the light from the young shoots; and when the fence comes to be taken away, the hedge on that side is not so good and handsome as it should be; for it must be evident to any one, who has made observations, of the ill effects to hedges by cramming them full of dead browse of any kind, or whatever excludes the light, or prevents the lower branches from spreading and keeping their leaves in a healthy state, whether it arises from being crammed full of thorns, nettles, or other weeds which are suffered to choak them, or from close dark paling; this kind of fence obviates all this; and if required to protect the bottom of an old hedge, stakes of 3 feet long, with the spurs left on, will answer the purpose, by keeping it light and open; the bottom would have a chance to fill up, if the top of the hedge is not too wide and spreading.

I have been thus particular in recommending this as a cheap and durable fence, with a view of consuming the young larch and spruce firs; for I suppose the spruce will answer as well as the larch for these purposes, after they have performed their offices as nurses to other plants, rather than let them grow so thick as to injure each other, as well as the more valuable wood that it may be wished to encourage.

This would be one material and cheap way for gentlemen to consume their young larches, either for their own use to save more valuable timber often cut for paling for their tenants' use, or which might be profitable for sale. Another method is, making crates for packing glass or earthen ware in; but this sort of consumption can only be in particular situations, in the neighbourhood of such manufactories. A larch about the thickness a person can grasp with his hand, at 3 feet 6 inches from the ground, is size sufficient for the glass crates. The crates for earthen ware require them a little longer.

The tops of the larches cut off, the glass posts I have sold for 5d. per score from 3 to 4 feet long for hedge-stakes upon banks, and some of the shorter tops from 2 to 3 feet long at 2d. per score, which answer well upon banks 3, 4, or 5 feet high, for protecting the bottoms of hedges that are open, and have been spoiled by sheep or other cattle browsing on them; if stuck in the bank, projecting outwards similar to the fences in the forest, before described, and wound with briers, black-thorns, or any slender thorns, it makes a cheap good fence, and, by leaving the bottom of the hedge open, it fills up in a few years, and is preferable in many respects to cramming the bottom of the hedges full of dead browse of any kind, which is too common a practice.

The larch stakes from 3 to 4 feet long are useful to nursery-men, or those who grow cabbage, turnip, or other garden seeds for sale, who require stakes to support them, which may be housed when not in use, and will last for many years.

I believe the larch stakes would make the most durable and best hop poles; by shortening and thinning off the branches, they may be let grow till they are of a sufficient length and size for that purpose, without doing injury to the other wood. The hop growers would soon find a great saving from their durability, and gentlemen within a reasonable distance would meet with a ready sale for their larches.— The larch that cannot be sold will make charcoal; and the side branches cut off will, from their lasting quality, answer well to put in wet parts of the roads in the woods, to prevent the timber carriages cutting them deep, and are a very cheap and ready material in wet seasons; the smaller fanned branches, or those with numerous small twigs on them, are very good to shelter peas, seed-beds of tender plants, or for protecting seeds newly sown or coming up from birds, and for fruit-trees in blossom in the Spring; they are preferable to evergreens, as the larch admits the light similar to nets, and may be easily stuck under the main branches; no doubt there are various other purposes they may be applied to that I have not thought of, but I deemed it of some importance to mention as many sources as occurred to me, to induce gentlemen to begin to thin out at an earlier period than is generally thought necessary.

Having seen so many plantations spoiled by planting thick for shelter as it is supposed, and knowing the great reluctance many gentlemen feel after they have planted to cut out any thing till it comes to profit, by which very neglect so many fine plantations are spoiled; similar to gardeners who, when they have a good crop of fruit on wall-trees, feel a reluctance to thin, and but few find resolution to thin it properly, which causes it to be small, not so well flavoured, and weakens the tree for future bearing.

Having shewn in what a short time larch or other wood, considered as nurses, may be turned to profit, the other wood benefited and brought to quick profit also, I trust this first effort of mine will be appreciated by those gentlemen who take pleasure in planting forest trees, and who will take the trouble to think for themselves.

If oak woods are the best and most desirable, (which I believe to be the opinion of most people who plant) neither larch nor any of the fir tribe ought to stand among them longer than they are 18 or 20 feet high, or contain about a foot of timber, except a few on the outsides, or particular places which gentlemen may want for their own use; but, perhaps, where larches are wanted to grow to a great size, it would be better to plant them by themselves, not forgetting to thin them out at proper times.—

I believe they will pay better at the sizes I have described; for, if not cut then, they must stand till they have arrived to a much greater size before they can be cut to advantage, by which time any other wood among them will be spoiled.

I have before said I could demonstrate that two or even three trees might be made to grow for a given time, with equal advantage to all, where only one grew before, or rather spoiled and injured its neighbours; a position which I shall endeavour to make more clear.—When larches and alders are planted with other wood at 4 feet apart, the most common distance of planting forest trees, as the larch and alder take to the ground the first season, in about 4 or 5 years the branches touch each other; whereas the oak, ash, and elm are often that time or longer before they make an effort to grow; when the branches of the larches, alders, or other firs have met, overhang the oaks, exclude the light by their shade, and by their warmth and closeness the grass and other herbage grow very long, overtop them, and keep them so close, that they can make no branches or leaves, and in a few years the greater part die, or are beat and bruised by the branches of larches or other trees, which have so far got the lead that they cannot grow; if, by chance, some of them should make a leading shoot through the branches towards the light, as is natural, they can make but few leaves or side-branches, and grow tall and dwindling; and when the larch or other tree is removed, it cannot support itself, gets top-heavy, bends to the ground, and is a long time before it can recover itself, if it ever does.

When trees are planted at 4 feet or any other distance apart, and when the branches begin to touch each other, go over them, and shorten the branches of the larch, or any other tree that has encroached upon its neighbour, to about 18 inches or 2 feet at the bottom, and rather closer at the top; but this might be regulated according to the distance the encroaching tree is from the trees that are designed to be permanent, and the time it may be supposed to take before it will encroach again after this shortening, if not taken out. This work is best performed in the Spring, Summer, or Autumnal months, as the other trees are easier to be seen when in leaf, and not so much time is lost in looking for them, which, of course, increases the expence, and should be avoided as much as possible, as this is all money going out before any returns are made ; which is very discouraging, and which, perhaps, may be one reason why plantations are so often neglected at this important period.

I am now speaking of letting every tree grow till it will turn to profit, if it is likely, or else cut it down at once ; by shortening the branches it will be longer before the plants injure each other, as I have proved by experiment that they will increase as fast or faster than if they had not been shortened.

The alder is a very spreading tree, therefore it should be shortened in if it is straight, otherwise cut it down. But I would only recommend the alder in wet ground, where the larch will not grow; and I hope to be able to shew that the larch will grow on wet ground if properly drained and otherwise managed, (as has been said before) without which precaution it will not thrive at all.

However, shorten the branches of the larch, alder, and also all strong straggling branches of oak, ash, elm, &c. if they have made any, and clear the grass and other filth from round the stems, to enable them to make side shoots; for if they should have two or more strong leading shoots, shorten all but one, reserving the straightest and best for the leader to form the stem of the future tree.

By this method every plant gets an equal share of light and sun; the larch might grow till of a size to suit the various purposes before enumerated; if hedge-stakes should be wanted, go over them and take out the worst formed ones; if the spurred stakes for paling are wanted, select the next sort, with plenty of side-shoots on, to make them handsome; others for espalier stakes, glass posts, or any purpose those sizes may be wanted for, leaving others for light railing, hop poles, or any thing that is required to be straight and in the tapering for any particular purpose, still leaving the biggest till they arrive at the size when they should stand no longer, without injuring what they were designed to benefit.

The plan I have pursued here is to take them out to suit the demand, still to mind the grand object, the navy timber; but now, when the small ones are taken out, I am taking all the largest sizes that will make a 7, 8, or 9 quarter prop, or for other purposes they may suit; and, as they pay the most money, from 4 to 5, 6, and 8d. per tree, by taking the largest out it admits more light to the oaks, and prevents them being drawn up too tall for navy purposes; the smaller larch can be left a few years longer, without detriment to the oaks, till they arrive at that size. If a small larch should be too near an oak, by shortening the branches from overhanging, it may stand a few years longer till it arrives at a proper size, if there is room on the other sides.

By pursuing this plan the greatest possible advantage is derived, at the same time accelerating the growth of oaks and other wood. Before the expiration of 20 years the larch may be all cleared, also many of the elms and ash may be taken out, if they should be found to be injuring the oaks, as I have before shewn. It is very probable that, in some situations, trees may arrive to a greater degree of growth, if properly taken care of from the very first. When the oaks are arrived from about 10 to 12 or 14 feet high, it will be time to begin to spread them to form crooks and knees when a proper crook occurs.—Therefore at this time, whatever encroaches upon the oaks, or is much higher, should be removed, or a very few years neglect will ruin them beyond the art of man to remedy; as they will soon rush up to a great height, without side branches, or those natural crooks that are of such essential service in ship timber.

After all the care which may be taken to cause the oak to form those natural crooks, limbs, and knees, which may be done by art in assisting nature, there will be still plenty that will grow straight. The quick growth of the oak among larch or other shelter, is truly astonishing. In 1823 I measured the leading shoot of an oak among the larch; it grew, in 1 year, 5 feet 1½ inches, and several others from 4 feet to 4 feet 6 inches in length. From this fact any one may be able to judge what progress they will make; but, it must be observed, they will not grow that length for two years together, as the next year they will form side-branches if they have room, otherwise they will ascend in height; which strongly shews the necessity of plenty of room.—From what has been said it must be evident, how much care and judgment are required at this critical period; for, without them, all a planter's fond hopes may be frustrated, and he knows not why.

CHAP. VI.

On the advantage of keeping plants free from the various shrubs, or herbage, that overgrow and exclude the light, (for air cannot be excluded) and prevent the increase and healthy state of the leaves and branches.

Having shewn what may be accomplished by proper care and attention in a short time, I must now endeavour to point out more fully the causes that may and do operate to disappoint a planter both of his pleasure and profit; when gentlemen plant, they are too apt to think no further care necessary than merely to keep out cattle or sheep from the plantation for a certain time, and as they generally plant by contract, without duly considering the proper kinds of trees, or to what uses they may be ultimately applied ; it must however be planted, and then little more perhaps is thought of it by the proprietor himself for a long time after.

Respecting the kinds of trees proper to plant, perhaps I may give an opinion hereafter. The plants, as to kinds, should be suited to the particular soils and situations. After planting, the utmost care should be taken to keep every plant as clear as possible from being encroached upon by long grass, fern, whins, broom, brambles, or any other thing that excludes the light and prevents it making branches and leaves; as, from what I have said and shall have to observe, I am strongly of opinion, almost to demonstration, that the chief part, if not all, the nutriment is taken in by the leaves of some kinds, and of course in a greater or less degree by all kinds, of forest trees. Care should therefore be taken, from the very first, to cut or beat down every thing around the plant; but whins or heath may be necessary and useful in cold situations, for a time and at a little distance, so that the stem of the plant has free access to the light; but if it is close to the stems, the plants cannot produce leaves or branches, consequently cannot thrive, and the whins or whatever it is soon outgrow the plant, meet at top, and exclude the light; of course they soon turn sickly and die if not relieved, particularly those kinds of plants that are so long after planting before they make a shoot.*

I have seen plants of every kind, even the larch, totally destroyed in 3 years, from planting where whins and other herbage are thick and luxuriant. But the effects of neglecting to cut the whins, briers, thorns, broom, or such stuff, from among larches, are more destructive to them, (if not totally killed) than to oaks, elms, and ash; these kinds, if not killed, may recover in some measure when the stuff is cut away, by cutting it off or making fresh shoots from the bottom, but the time that is lost cannot be recovered. Not so with the larch and other of the fir tribe; for if they lose their tops or leaders, from the friction of the winds on their tender shoots, by the prickles of the whins, or the branches of any other kind of thorns, briers, broom, or any thing that grows near them, and if they once lose their leader and become shrubs crooked or bent, they are fit for none of the purposes before stated, not even for shelter. But though the larch, from its quick growth, may keep its head above the whins or other stuff, yet, as it can make neither side-branches nor leaves, it runs up in length without increasing in substance; and I am apt to think the roots only increase in proportion as the branches do, the ground under all thick cover becoming spongy and light by the field mice, and other causes; and that, whenever this is cut away, the larches are top-heavy, and, having no firm hold of the ground, are blown down or fall by their own weight, and are crooked, particularly if there have been heavy snows, to press all this weight of cover to the ground, and they become hide-bound by the friction of the branches against the prickly whins. It is astonishing the damage the larches and other plants receive from this cause alone, among strong whins, or other trees or bushes that interfere with them; so that, by these untoward events, which may be avoided, the larches are destroyed, or so injured as to be unfit for any of the purposes I have mentioned, as a crooked larch when young is fit for nothing except charcoal and the fire. It follows, therefore, that all those beneficial results and profits, which I have proved may be derived by early care and attention, may as easily be lost by neglect and want of considering these things; as many gentlemen may see by looking into their own plantations.—There are places in these plantations that were planted on as good land as any, that have produced those fine larches and oaks I have been speaking of, but which were neglected clearing; and last winter I had to cut and plant it over again, when I found it was nothing but whins and broom that had done all this injury.

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* I shall not in the course of this work mention the air as being so essential as light to the growth of plants, yet there is no doubt but they are mutually necessary; because, if we cut away all the side and under branches from trees, or if after they have grown so crowded together that they have decayed of themselves for want of light, and although plenty of air may be admitted, yet the air is of such a nature that it cannot be excluded. Thus, we find by experience that plants in the shade, or where they have the most air, will not thrive, which has induced me to lay such stress on the necessity of admitting a free exposure of plants to the light.

Now let any gentleman, or those persons who have the care of woods for the benefit of others, reflect and think of having larches worth 6d. and 8d. a tree, at 11 or 12 years growth, and oak, ash, elm, &c. of the sizes before described, or to have the mortification to have the ground to clear and plant over again, at a much greater expence than the first, without deriving any profit whatever from the first expence. This may arise through ignorance, and not duly considering these matters, or the fear of incurring a greater expence than there was any prospect of getting back in a person's life-time, (and I have known instances where plantations have been suffered to be injured from other motives, which it is not necessary to state here.)

Without the greatest care and judgment in contriving and executing such kinds of work, the expence may easily be made greater than it ought to be; but, if gentlemen understood the nature of these matters a little more themselves, and not trust too much to the opinions of others, (who perhaps know less) they would soon see if these things were conducted properly; which it is the design of this work to make as plain as possible, that gentlemen may understand it themselves, and not rely so much upon the opinions of others.

Having shewn that plants, in the very best land, may be destroyed in 3 years by the over-growth of whins, broom, &c. how much does it behove gentlemen who plant for present profit, their children and posterity, to attend to these minute circumstances, when it is seen what great good may be derived from it, or lost by inattention: losses that can hardly be remedied! And the longer this work of keeping the young plantations clear of these enemies to all their hopes, the greater the expence and difficulties become every year it is so neglected; first, in the time it takes to look for the plants, and when it grows large, (if the plants are thickly planted) to find room to lay it down without laying it on the plant.

When broom is cut, the roots will die; but whins, and most other things, will shoot again. I prefer cutting the whins off with a hook to stubbing them up by the roots, and laying the tops upon the stumps; by this means the greater part of them will be smothered; it is much sooner done, of course at less expence, and not so much danger of hurting the plants.

When land, addicted to whins or broom, is planted with forest trees, they may be permitted to grow 3 or 4 years and be of great use, if care is taken the second or third year to go over them in Summer, when the leaves are on them, with a hook, and cut the whins or broom from around each plant, which they are likely to smother. This must be done before the plants are hidden, so much more time being taken to look for the plants, which of course occasions a greater expence; a great object, when gentlemen understand and manage their own affairs; but it happens sometimes, when people manage other's affairs, they are not so exact in these matters as if it was their own property.

Having shewn the utility of taking care, from the very first year of planting, that the young plants are not injured by rank herbage, whins, broom, birch, willows, or any thing else; the next thing, of the utmost importance to accelerate their growth and to form timber for particular purposes of shelter and ornamental trees, is the manner of pruning, or assisting them by art. But before I present my ideas upon that subject, I must be allowed to explain the utility of leaves and branches in a healthy state to the growth of trees; for that without branches there can be no leaves, must be evident to every one.

CHAP. VII.

On the utility of leaves and branches.

A great deal is said upon the goodness of soils for forest trees; but I am strongly of opinion that, after a plant is established and got root in the ground, less depends upon that circumstance than is generally imagined; or else why such fine timber in such opposite extremes, from the very best soils to the very worst, even upon barren rocks, and upon sands and soils of such different qualities? If trees derived their nutriment from the earth by the roots, is it not strange they should arrive at nearly the equal perfection we daily see in such different situations?*

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* I have seen the juniper, mountain ash, lilac, elder, and other plants, grow to a considerable size upon old walls of churches, and other buildings in ruins, a great height from the ground, where the mortar was as hard as the stones, and where the roots could have no communication with the ground; whence do plants, in such situations, derive their nutriment?

That some plants derive most of their nutriment from the gases in the atmosphere, is evident, (then of some why not others?) for instance, the houseleek, and other succulent plants and mosses, lichens, and some others, natives of Europe; but when we consider the vast quantities of plants so constituted, natives of the tropical climates, such as the *Mesembryanthemums*, *Cactuses*, *Aloes*, and many others of the like nature in those hot countries, where the rains are less frequent than in the temperate climates, the earth must of course be more dry and parched, and those plants perhaps could not grow if they did not derive their support from the gases in the atmosphere; and as heat and vapour are the causes of them, they may be more abundant in hot climates than in cold ones.

From the little knowledge and experience I have of plants, natives of the tropical climates, that are cultivated in stoves in this country, it occurs to me that they have generally thicker leaves, and those of a more succulent nature, than plants of more temperate or cold climates; but this

I must leave to persons who have more experience than myself, to the naturalist and the man of science; it perhaps may afford a hint to Sir Humphrey Davy, or others, to inquire into or make experiments upon.

That some of the ever-greens are so constituted, as to take in their nutriment by the leaves, appears to me probable; most of the *Erica* tribe will certainly die if ever they lose their leaves, either from too much water or too little given to the roots; as any person, conversant with the culture of that tribe, can testify. It might afford a good experiment, to strip the leaves entirely from a vigorous healthy plant of this tribe, and supply it with water the same as the other plants with their leaves on, to see if it would live and vegetate. I believe it would not; but I may be mistaken.

The ever-greens of the fir tribe appear of the same nature; if ever they lose all their leaves, from whatever cause, they never make fresh ones, like some of the deciduous trees; the juniper is of the same nature. An experiment upon these kinds may be worth a trial. This sort of tree never throws up shoots from the roots or stems, if cut below any living branches with leaves on; some of the close-grained kinds of the deciduous trees appear of this nature, such as the beech and hornbeam; these plants seldom, if ever, spring from the root, if cut below a living branch.

The evergreen pine tribe, which arrive to such an immense size in the cold climate of the north; the leaves of these plants seem peculiarly formed, at least different to other kinds, perhaps to imbibe the gases that are afloat in the atmosphere in those cold regions; for, I understand, they will scarce live, or become a stunted shrub, in the hot climates; perhaps other plants, natives of those cold climates, may have a general peculiarity in the structure of their leaves, similar to those in the tropical climates; but this is a subject I must leave to be considered by those who have visited those regions, and who may have had better opportunities and qualifications to pursue such inquiries.

Here we cannot but admire the wisdom and goodness of that Being who has endowed every vegetable, as well as every animal, with organs proper to derive its support from the various food the different climates and situations afford!

Some of the evergreens, such as the common laurel and some others, as well as the deciduous trees of a soft nature, possess sufficient nutriment in the roots and branches to enable them to vegetate again after losing their leaves, or having been cut below any living branches.—I shall mention, in this place, a few more instances why it appears to me probable, or rather certain, that plants derive their chief support from the atmosphere through the medium of their leaves.

The pine apple, vines in stoves, or any exotics in pots, whenever the leaves get diseased and injured, the plants will not thrive, nor will the fruit be good for any thing, supply them how you will, by earth or water, to the roots; the same is the case with melons in frames, when attacked and injured by insects; and particularly the gooseberry, which is familiar to every body, when the trees have been stripped of their leaves by the caterpillars, the fruit never grows afterwards, and is good for nothing; nor does the tree increase in size till it has made fresh leaves, however good and rich the soil may be, nor even then but little in comparison with those in the same soil that have escaped the ravages, and have retained their leaves in a healthy state; but the same is the case with most fruit trees under the same circumstances.

I have seen an account, but I do not recollect where, of a gentleman having either 3 or 500 different apples grafted upon one stock or root; which root must draw the same kind of nourishment from the ground, that must be altered and modified by the different formed leaves, some of which, perhaps, are barely perceptible with the best glass, to cause such a variety of fruits, both as to colour and flavour. Does it not seem as reasonable, or more probable, that the different formed leaves absorb more or less of the gases that are afloat in the atmosphere to cause such variety.

It might not be amiss to ask, where do the poisonous vegetables derive their noxious qualities from, the earth or the atmosphere? There does not appear to be that variety in the roots of different species of plants which there is in the structure and form of their leaves, to derive such different ingredients from the soil; if there should be the same or similar ingredients in the soil that are supposed to exist in the atmosphere, I am again under the necessity of confessing that here is another subject above my comprehension, and which must be left for others to inquire into; only I may be allowed to observe, that the fibrous parts of the roots of most vegetables appear nearly alike to the naked eye.

I once thought that the plants under the shade of the larches, or when excluded from the light by any other cause, provided they kept alive, and although but few leaves or branches were made, that the roots kept increasing all the time; but this I have since had reason to believe is an error, as it appears tolerably certain that trees increase in size from the leaf or leaf-buds, and not by the flower or fruit-buds; such at least appears to be the opinion entertained by the ingenious Dr Darwin, in his *Phytologia*, who adds, that those leaf-buds are extended also along the roots, therefore the roots can only increase in proportion to the leaves and branches. Thus it will appear probable, that when plants are in such dark and shady situations they make fresh efforts each Spring, while they remain alive for a month or two, to produce leaves, before the grass, fern, and other stuff get above them, so as to exclude the light from them; without which, leaves cannot perform their proper functions.—It may then be presumed that the roots grow; but when the plant has done growing from the loss of leaves, or excluded from the light by a thick shade, the roots grow no more that season; but as the roots are in their natural place, they remain in a healthy state till the next renewed efforts in the following Spring, except in wet or very cankered bad soils, when, being in an inactive state so long, they become diseased, and finally die, as they cannot be relieved, like the tops, by pruning or cutting away the diseased part.

From these considerations I am inclined to think, that the decay and diseases of most kinds of trees arise principally from external injuries to the leaves and branches; but let that decay arise from whatever cause it may, I have never observed the roots of cankered apple or pear trees, when taken up, diseased like the branches. But whether the leaves supply the tree with all or part of its food, or whether not at all, it matters little to my argument, as it appears tolerably certain that plants cannot thrive fast without a multiplicity of leaves, and those too in a healthy state. Whatever therefore tends to prevent them acquiring branches and leaves, or that injures the leaves either by natural diseases, such as frosts, blights, caterpillars, or various other causes, as the friction of the branches of one tree against another, or against whins, broom, briers, thorns, or any thing of the like nature, must be an error in practice, and an injury in nature; and whatever will increase the amount of branches and leaves, and preserve them in a complete and healthy state, so as to perform their proper functions, must be a *desideratum* "devoutly to be wished;" and that they *can* be so increased or diminished by art, I think I have sufficiently shown. But as I have a little to say on the nature and utility of pruning forest trees when young, I hope I shall be able on that occasion to throw some additional light upon the subject.

CHAP. VIII.

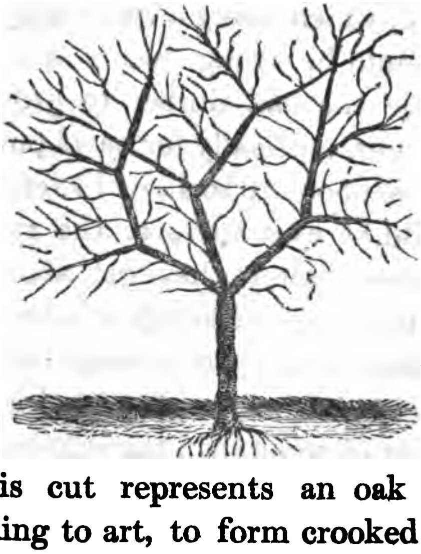
Pruning and training.

When trees are planted and stand clear of any thing else, oak, elm, beech, and some others are apt to throw out two, three, or more strong branches of nearly equal strength, which soon cause them to grow from the very ground, forked sometimes into two or three, leaving no straight stem, or else it becomes like a shrub, and remains in that state for years. When there are many shoots of nearly an equal size, my method is, to shorten the longest and strongest from about 2 to 3 feet from the stem, leaving the straightest and best for a leader, to form the stem or trunk of the future tree. This should be done as soon as they have made shoots of that length in Winter or Summer, but this was done chiefly in Summer when we were relieving them from the branches of the larches and other injurious neighbours. This operation will be found to be a great saving of expence, for by often going over the same ground, though but little to do, soon mounts up to a large sum; and shortening those strong shoots, checks the great currency of sap in them, causes them to shoot out numerous smaller ones which produce a greater quantity of leaves, and throws the greatest flow to the main stem, whether in ascending or descending; and by thus shortening them, those side-branches do not increase in thickness near so much afterwards, as if left so to ramble out as to form any large unsightly and often injurious knots on the stems of trees, if suffered to grow to a large size before they are taken off. Frequently, when the plants are in a vigorous growing state, I pinch off or shorten with the knife a strong vigorous shoot of the same year's growth, which answers the same purpose, and gains a season in growth. The side shoots should not be suffered to get large but numerous, till they arrive at the height you wish them to branch out, to form crooks if it is oak timber. I never take, or recommend to take, any of the side-branches off close at this early period, except there are any very large or much thicker than the leader, and plenty of smaller ones; then it would be proper to take the large one off close to the stem, to encourage the leader till it has got the ascendancy.

Another great benefit attending the shortening of these strong branches upon young trees, and which it will be proper to mention in this place, is, that it prevents them from being split or broke in heavy snows, as a weight of snow hanging upon those long branches bends them to the ground, and frequently splits them from the main stem. Great damage is done to plantations from that cause, as scarce a plant that had the branches shortened was injured by the great snow in 1823; but those which had not been shortened were very numerous, and were greatly injured by the splitting of the branches from the main stem, so that it became necessary to cut many a fine plant close off to the ground. What then must be the case with those plantations which are not regularly gone over to rectify these damages? Thousands of plants, that would have been fine trees, have been entirely spoiled; a loss visible to any one, who will but observe and look into it.

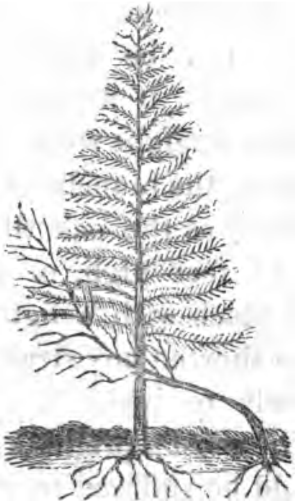
From the experiments it will be immediately seen, that the more numerous the branches the faster the tree increases in girt, which is the principal object; and by closely attending to this rule for a few years, the oaks will have arrived at a proper size and height to begin to form crooks and knees, if ship timber is the object in view.—It is well known that timber so formed sells the dearest, where it can be conveyed cheaply to canals or rivers; and when the oaks are arrived at from 5 or 6 to 12 or 14 feet in height, with two good shoots of an equal size and well jointed together, they will not split by the winds, heavy snows, or any other natural causes.—This is a very material circumstance, and well deserving the notice of those who have plantations, or who have the management of them for others. If forks are left that are not well formed by nature, they will, when the trees get up, either from heavy snows or high winds, split and break off, or open and let in wet, which spoils the trees; nor are they ever so strong, if none of those accidents happen, as those natural or proper ones well chosen; these firm joints will sometimes occur of themselves, and should be left whenever they do, but they may be formed by art. When the leading shoot is strong and of a sufficient height from the ground, I break out the central or middle leading bud, when probably 4 or 5 eyes or buds will make strong shoots from nearly the same place, as the buds are numerous, close together, and strong on that part of the shoot. Two or three of the strongest should be left, and of as equal a size as can be; the rest should be shortened near the ends to encourage the growth of those that are left, to form more crooks as they advance in height. When the central shoot is broken out, the others will shoot a little, inclining to the horizon, and form a crook; and as there are so many shoots at that particular part, it will become knotty, and where the bud was broken out the bark will join and grow over, and form one of those firm tough crooks so useful in ship-building. Sometimes I cut the last year's shoot out, if too weak, in an horizontal form, close to the extremity of the preceding year's shoot, where the clusters of strong buds are situated; perhaps they may have made side-shoots already, when you may choose two or three of the best for leaders, and stop or break the leading bud out of the others. But joints should not be chosen from the middle of the shoots where the buds are so far apart and not opposite each other, as they might split, or probably one might get the lead of the other; but when two strong buds are opposite each other, the shoot may be cut off in an horizontal form just above them, which will cause it to grow over and form a joint, though perhaps not so strong and good as those from the clusters of buds at the extremities of each year's shoots, the buds being closer together at each end than in the middle of the shoots.

Where there are larches among the young oaks it would be easy to fasten some of the oaks that were not too strong to be hurt in bending, but of a sufficient length to the larches in a bent position for about 2 years, with twisted withes, tarred twine, bass matting, or branches of the larch; thus you may have crooked timber in any form or quantity that might be thought desirable. This is the plan I have pursued for training the oaks for naval purposes in his Majesty's wood at Chopwell, which being a very windy country, it would be wrong, in my opinion, to encourage the oak timber to grow to a great height, especially for naval purposes; when from about 10 to 12 or 14 feet, every art should be used to form the trees for ship timber; after they get above that height, they may be safely left to nature, only giving them room enough for their heads to spread. After the head is formed and got of some size, the side-branches may be cut off, but I believe it is not necessary to oaks, as they will be but small after having been shortened; they will die of themselves as the top gets large and overshades them. After the first crooks are formed, by attending to the same rules more may be formed, and as all the branches except the leaders should be shortened a little, the main ones would grow the faster. When trees are left to nature, one main shoot will generally keep the lead; and, if the tree has room, it will throw out numerous side-branches, of nearly equal sizes, as it advances in height, without one useful piece in it except the main stem.

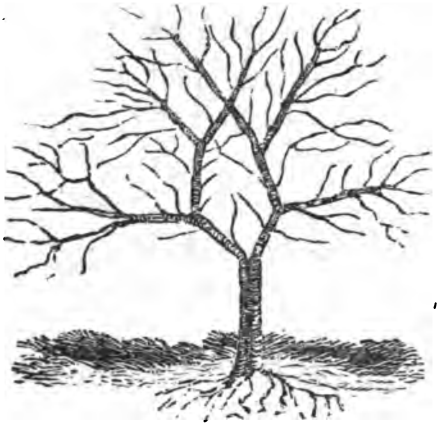


This cut represents an oak pruned according to art, to form crooked or ship timber, with three shoots at the first formation.

This cut represents an oak in its natural state, if not too much crowded.



This cut represents a young oak fastened to a larch to make it grow crooked.

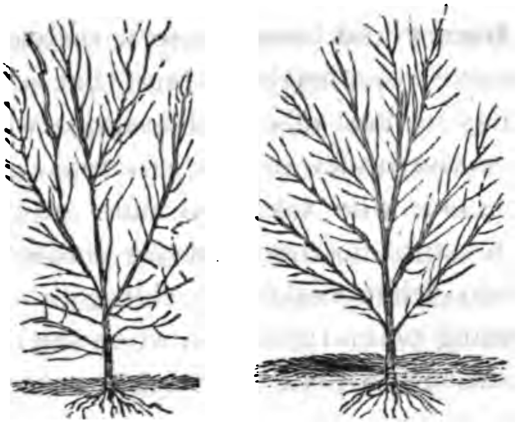


This cut represents an oak trained for naval purposes, with only two shoots left at the first formation.

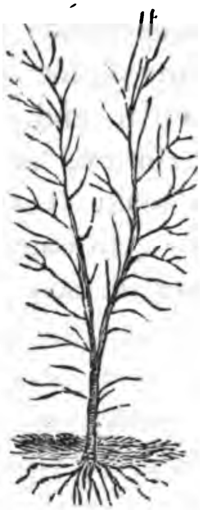
Beeches must be treated in a very different manner, if designed for timber trees, as clear straight stems are requisite in those trees; the branches may be shortened the same as the oak till they arrive to 14 or 15 feet high, or as high as a person can reach with a light hook long-handled, to shorten any stragglers or such as are likely to make it grow forked, and only the most upright and strongest shoot should be suffered to grow without shortening for a leader.

When the trees have arrived to a sufficient height with straight stems, and have formed good heads sufficient to increase the stem of the tree without the aid of the lower ones that have been shortened, they may be cut off close to the stem; for beech branches will endure in a living state upon the trees till the stem has swelled a foot or two over them, which must be very injurious to the timber; any one who will only observe when the branches are suffered to grow too long upon beech trees, the stems are never fit for any useful purpose, as the stem swells in such an unsightly and irregular form, owing to those thick branches being left upon them, as they will scarce ever die like an oak; perhaps if they are shortened when small, as it prevents them increasing so in thickness when the tree advances in height, they might not be of that detriment to the stem, but would naturally die away as the top gets above them and excludes the light. I will appeal to any gentlemen who have beeches in their plantations, if three-fourths or nearly are not useless for any purpose except fire-wood, by growing forked, and into numerous branches and stems, and the forks grow generally in such a manner as to hold the water; it is only for any person to notice this circumstance, where there are beeches, to be convinced of the correctness of what I have stated, and how easily it might have been prevented, or may be for the future; one single cut with a knife, hook, or pinch with the thumb and finger, to have shortened one of those branches when they were small, would have made a tree of great value, that is now fit for nothing but fire-wood. This is a serious loss, if gentlemen would but consider it; and the same holds good with many other kinds of timber.

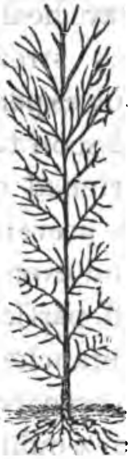
A person who understood the nature of this work, (and I should not be doubtful of making any person of common capacity comprehend it in a few hours, with practical instruction,) and what vast numbers a person might do in a day, and by repeating this once a year or once in two, for a few years, what thousands of fine trees would be to be seen instead of those useless, unsightly trees that are at this day in most of the plantations which have come under my observation. Any gentleman, who takes pleasure in rural affairs, might do thousands for his own recreation, when walking or riding through his young plantations; for, when the trees are advanced a little in height, he could shorten in a shoot with one or both hands occasionally as he sits on his horse, either in Winter or Summer, when in a growing state, just as he has time or inclination; and when he understands it himself, he could instruct any of his servants or labourers how to do it, and judge when it was properly performed or not. I have endeavoured to make it as easy to be comprehended by gentlemen as I possibly could, for that very reason.

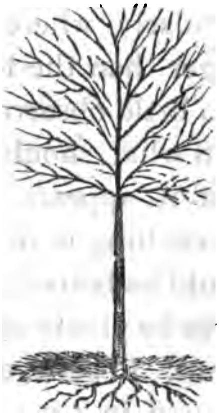


These cuts represent two young beech trees, where they have room in their natural state, the branches not shortened.



This cut represents a beech growing forked, where it has had less room at the parting of the two main branches, is generally a hollow that holds water, and when the trees grow large extends a good way down the stem, and spoils them when they are young and have their branches shortened, as I have been recommending. When such shoots as these occur, one of them should be cut off close to the stem at first, that the place may heal over, particularly where it is as strong or stronger than the leader; but experience, with a little observation, will soon teach a person what should be shortened or cut off; if it appears likely to prevent the stem swelling in a regular and even form, it would be better to cut it off, particularly if there be plenty of smaller branches near it; but, I believe, if the branches are shortened in time, the stem would swell in a regular even form, without cutting very few if any of them close at this early period, as every branch so cut off deprives it of so much means of increasing in thickness; yet it must be noticed, that very small branches will very frequently cause a great injury to a beech tree in preventing the regular swelling of the stem, and when that is observed there is no doubt but they ought to be removed, and as close to the stem as possible. In fact, the beech appears to require, and will be more benefited by, judicious and timely pruning, than any other of the forest trees.





The first cut represents a beech with the side branches shortened when young.

The other represents it when the branches have been taken off close to the stem, after the head has made sufficient progress to keep the stem in a vigorous growing state.

When beeches are designed for ornamental trees near gentlemen's houses, for shelter, or to hide any particular object, they then require a different management again, by only just shortening the extremities of the longest straggling branches when they have extended as far as it is wished, and to shorten all the strong leaders but one, if forked trees are not wished for.

For ornament and shelter on the outsides of plantations, and for hiding unsightly objects, no tree answers so well as the beech, as it will branch or *feather* (as it is sometimes termed) down to the ground, and by shortening the branches at the extremities, they will thicken by producing more small ones, which with their numerous leaves will make a thick skreen, and, being so durable, will continue in that state for ages; but care must be taken not to shorten the lower branches too soon, or too near the stem, except any one that has outgrown his fellows, because, in all cases of ornament or skreens, nature should be copied as much as possible, as the lower branches should extend, as they will naturally, rather farther from the stem than the upper ones, otherwise the trees become naked at bottom, and the object they were intended for defeated.

The side or lower branches on oaks or elms are more liable to decay, when the head of the tree gets up and overhangs them, than the beech, therefore are not so proper for skreens and shelter. Elms should have their straggling branches shortened the same as the others; it is a tree that is apt to throw out strong forked straggling shoots in the first years, which should all be shortened as high as it is deemed necessary to have clean straight timber; but if it is required to have crooked elms for boat or ship-building, or any other purpose where crooked timber is required, they may be trained similar to the oak for naval purposes; by shortening in the branches, it keeps them within bounds and from encroaching on their neighbours, causes them to throw out numerous smaller shoots, which increase the stem both in thickness and length, and make it fit to take out the sooner.—I am alluding to the Scotch or *wych* elm.

Ash wood, being required to be straight and as free from knots as possible, must be kept to one leader, and from any very strong side-branches; and as it is a tender plant when growing, and very apt to have its young tender shoots nipt by the Spring frosts in low moist situations, it is very apt to throw out two shoots of an equal strength, which will cause a fork, and of course spoil the tree. Therefore these trees should be carefully looked over, to keep them to one straight leader, till they have got to 14, 16, or more feet high, otherwise thousands of fine ash are spoiled for want of this simple, easy, and cheap operation, similar to the beeches, elms, &c. The ash being very hardy, except when making its tender shoots, is well adapted for high bleak situations.

The natural growth of the Spanish chesnut appears to form straight timber; but being a timber fit for ship-building, there is no doubt it can be trained by art to form crooks, knees, or any form required in the construction of ships, by the same rules or something similar to what I have stated concerning oak, as the same will apply in respect of firm tough crooks, &c.

The larch will bear cutting as well as any of the other deciduous trees, if done at a proper season. When a young larch has lost, by any accident, its leader, the next best upright shoot will form one, if the others are shortened; if it grows rather horizontal, it might be brought in an upright form by twisting one of the branches on the opposite side, drawing it in an upright position, and fastening it with a kind of knot; I have saved hundreds by this easy operation.

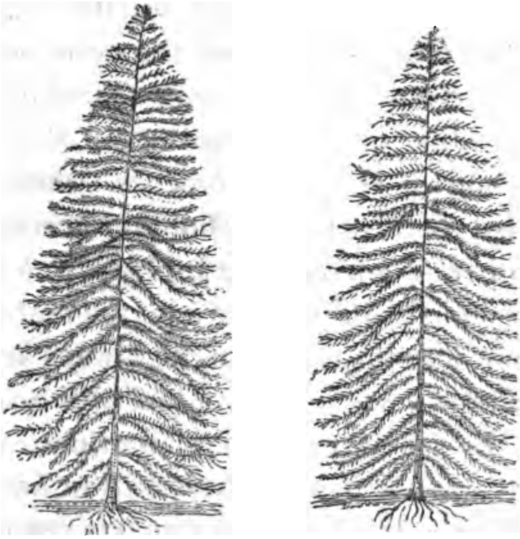
After a larch has been planted and had 3 or 4 years growth, it is a pity a plant, that in as many more years would be of so much value, should be lost for want of such a little trouble. When it is considered what a number of trees or acres of ground a skilful active person could go over in a day, or what numbers even a gentleman could prune or correct when merely amusing himself in his plantations; and when we look forward to the value of a well-formed tree of any kind come to maturity, compared with one of those great ill-formed ones that have been left to nature or neglected, which are so frequently to be met with, and which when cut down, after incumbering the ground perhaps from 50 to 100 years or more, are of little value except for the fire, and to contrast the difference, and reflect that, with a few cuts of a knife in the hands of a skilful person in its infancy as it may be termed, would have made it a tree of great utility and value; after all this, I say, how much it is to be regretted that such great results should be lost, from the want of applying in time to so useful and simple a remedy!

It is a very erroneous opinion, though very common, to suppose if a larch has lost its leader it is spoiled; because, when young and in a vigorous growing state, another leader may be formed, but not where it has been injured and overhung by other plants, and the top and side-shoots become weak and dwindling.

If ever the larch timber should be made use of in the construction of boats or ship-building, which it is probable it may from its durable and tough quality when in a moist state, it may easily be trained to form crooks, knees, or any course required, by taking out the leader and reserving one or more of the best placed side-shoots, or by fastening it to another as described for oaks.—I have tried the experiment upon a few to ascertain its practicability, of which I have no doubt myself.

The Scotch fir sends out many side-branches, which extend a long way all round. If there are any other kinds planted, such as oak, elm, beech, &c. the Scotch fir branches should be shortened the same as the larches; having tried the experiment upon a few trees, by breaking out the leading or central bud from the side-branches, and by cutting off the last year's shoots in the middle, with a hook similar to the larches or other deciduous trees, and find it to answer well, as the branches will emit fresh shoots from where they were cut off, it prevents their rambling and overtopping the other plants; whether they would make shoots from wood of two or more years' growth, I have not ascertained.

The spruce fir will bear the same operation, if done when young or near the ends of the shoots, or by breaking out the central bud of the side-branches, when extended as far as it is thought necessary, or till they encroach or injure a tree that is designed to remain as a permanent one, which circumstance ought always to be kept in view. This method will answer well in the interior of plantations, as it tends greatly to keep them within bounds till they can be taken out to answer some useful purpose, and keeps the plantation warm for the encouragement and growth of other wood without injuring it; but when they stand singly for ornament, or on the outsides of plantations for shelter, skreens, or blinds, perhaps it would not be proper to shorten them; although in respect to blinds, or for shelter, I am inclined to think it would answer well, by thickening or making the branches more numerous and close. A few experiments might be useful, to try its effects in such situations.



This engraving represents two beautiful spruce firs with pendulous branches, supposed to have been planted about 70 years, growing singly by the side of a rivulet in the pleasure ground at Hamsterley in the county of Durham, the seat of A. Surtees, esquire, and reckoned the most handsome of their kind in the north of England.

Their picturesque beauty, standing singly, is particularly marked, and not having been spoiled by being placed too near each other, or encroached upon when young by other trees, to prevent the fair and regular spreading of their branches ; whether the moist situation (being near to the stream and sheltered by other trees and rising ground) causes them to grow pendulous, by a heavier weight of dew, rain, or snow hanging longer upon their branches, I cannot tell, and must leave it to the conjecture or investigation of the more curious and profound naturalist.

I am inclined to think that, by shortening the branches of Scotch, spruce, and larch firs, in the manner I have described, in the interior of plantations, when young, will prevent those side-branches from becoming large and thick ; consequently from making large knots in the timber, which may be left on till the tree arrives at such a size that they will be overshaded by the top branches, when they will die of themselves, as they do when planted thick together and left in that state a long time, without producing those great knots which are so injurious to the fir timber.

I have not had experience long enough to be certain of it; but I have seen very ill effects from bleeding, by cutting the thick branches from the Scotch, spruce, and larch firs, close to the stem, independent of the injury it does them by preventing their increase in thickness, (as I think I have proved by the experiments) besides making them so unsightly.—I believe the method I have been treating of will be found far superior whenever it comes to have a fair trial, I mean in respect to leaving knots upon the timber; all the other facts, I think, are indisputable.

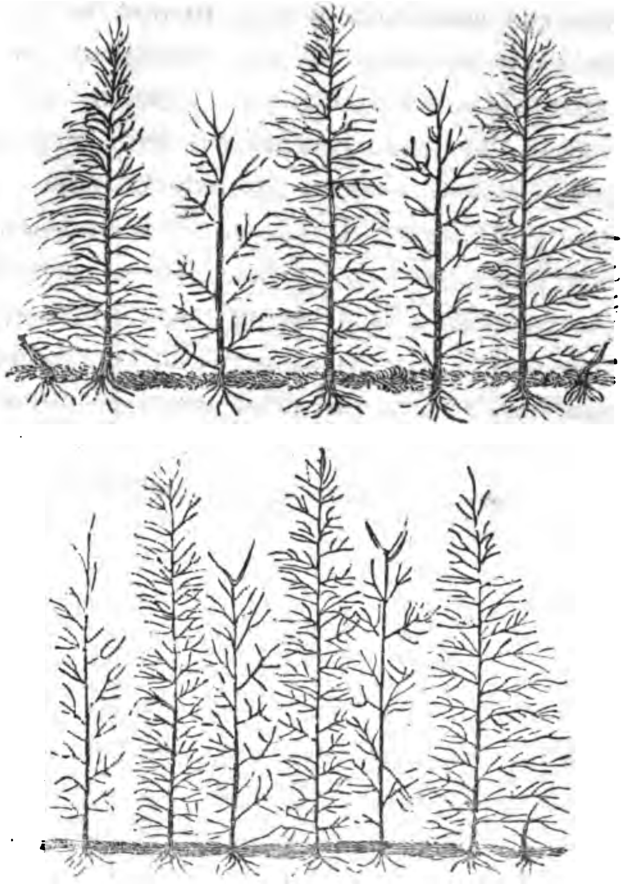
It has often surprised me to see, near gentlemen's houses, where plantations are made for ornament, blinds, skreens, and shelter, a quantity of trees crammed in very thick to get a blind, &c. as quick as possible, which are suffered to grow up all together without ever taking one out till all the side-branches are killed and the trees become naked at the bottom, letting in the cold winds through them worse than if there were no plantation.

I have before observed, that when gentlemen have planted they feel great reluctance to cut down or take out any part; but if they would once determine what kinds of trees they wish to remain as a permanent wood for ornament or shelter, they would accomplish all these objects by constantly observing to shorten the branches of those trees which encroach upon those that are intended to remain; and as soon as they are so near each other that shortening the branches will not answer, or that they overgrow the others, then take them out entirely. By attending to this simple rule, you will have your permanent trees with branches to the very ground if required, from first to last, the plantation close and thick at bottom, and they may be made to form handsome trees of their kinds; some may be left to nature unpruned, or trained to form what fancy may suggest as fantastic trees, if such should be the taste of the proprietor.

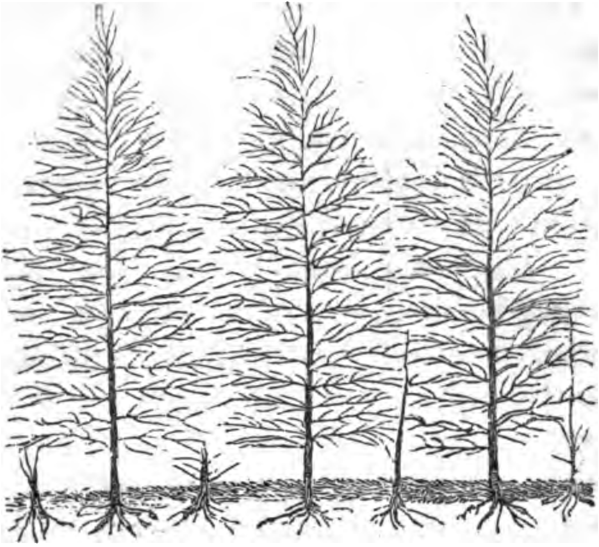
But if they are neglected, as is too often the case, and suffered to grow all together, you will soon have nothing but naked unsightly trees about your mansion, with a few branches only on one side, and perhaps only a few at the top, with the very objects they were intended to hide in full view through the naked tall slender stems; but by attending to the rules I have been describing, in about 10 or 15 years, all those objects will be happily accomplished.

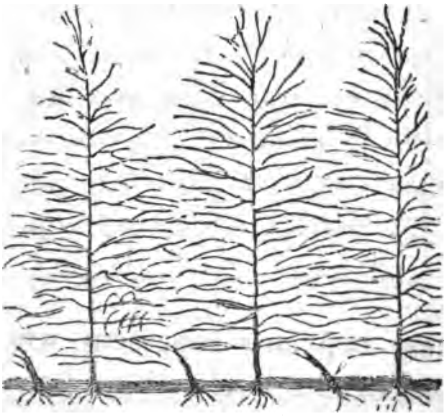
If a young gentleman, when he begins planting, would but well consider these things, what may he not live to see in his days? The most beautiful and ornamental trees flourishing round his domain of his own planting, with all his ideas of ornament, blinds, skreens, or shelter accomplished; instead of the dismal spectacle, after a few years, of returning to the state in which he first found it, all open, exposed, and naked at the bottom !

The engraved groups of plants in the two following pages represent larches, with oaks, beeches, or other trees, at 4 feet apart.



These two cuts represent where the branches of the larches have been shortened to admit light and the sun's rays, and the straggling and strong branches of the oaks shortened, with the central bud broke out of the leading shoot of some of them, to form crooked timber.





These two cuts represent larches and oaks at the same distance, and of the same year's planting, not shortened, left to chance, or part of the lower branches of the larches cut off close at the stem, which must shew the difference of the two modes in a striking point of view.

Having said so much about planting, it will be supposed I might say what kinds of trees would be best, but that depends upon taste, local situation, and other circumstances dependant thereon, so that it is rather a difficult point; however, I hope, without presumption, I may submit my opinion on the subject.

In a general way, I would plant chiefly oak and larch, as, from what I have shewn, larch comes soonest to profit, and an excellent nurse to the oaks, provided you remove her in time, or she will soon spoil them, varying the proportion according to circumstances, because I consider the oak as the most valuable timber. When it becomes large enough for pit props, if found too crowded it may be taken out to advantage; and the undergrowth from young oaks cut down is as profitable, and perhaps more so, than from any other wood, besides the noble appearance fine oak woods have.

In low situations, where the soil is rich and deep, and by the sides of drains, ash or elm may be planted; my reason for recommending to plant ash by the sides of the drains is, they may be planted very near to the edge, because in a few years they would be fit to take out; whereas if oak or other wood, that is to stand a long time, if planted so near would be apt to be blown down, or undermined by the washing away of the soil, if there is a current of water; besides there is more space over the drains for their tops, before the branches of the other trees meet, that are planted further from the edge of the drains, and ash is a wood that soon comes to profit, and is not so injurious to others, having fewer branches and less top than some other kinds.

In low situations also the fir tribe may be planted, either kind, separate or mixed, as may be judged expedient by the proprietor either for shelter, profit, or ornament, as nurses and shelter to oaks and other tender kinds, to protect them from the effects of the frosts when in a growing state, as noticed before, and till they have arrived at a sufficient height to be above its influence when the firs should be taken out.

In very high and cold situations more of the fir tribe may be used; and where the larch will thrive, it is certainly preferable to any of the other kinds.

The sycamore, or plane as it is called in the north, thrives well on high bleak situations, and looks well as an ornamental tree on the outsides of plantations, or on the highest parts if the ground is hilly; it makes a grand object at a distance from its dark green, thick, and the cloudy appearance of its foliage; also in groups of a considerable quantity together, it has a noble appearance; but it should never be introduced in the interior of a plantation, as it is a bad neighbour to others from its spreading branches, thick foliage, and quick growth, and but of little value till arrived at a great size.

Nor do I approve much of birch or alder; they are bad neighbours to oaks, or other plants of more value; the alder may be introduced for shelter in wet places, where the larch or other firs will not thrive; but as they are a spreading tree, where they have room the branches must be shortened, if other wood is among them, as described for the larches, or they will soon do more harm than good.

Elms are not good trees to plant among oaks, from their spreading and quick growth, and being required to be older and longer than larches before they can be taken out, so as to derive any profit from them, when perhaps they may have spoiled the oaks or other trees considered of more value or importance, if ornament is an object; but if the straggling and strong branches are shortened to keep them within bounds, they may be left till they are fit for some useful purpose; perhaps it would be better to keep such overgrowing trees in groups by themselves, or with others of the like nature, to derive the most profit from them, for the weak cannot contend with the strong with any chance of success among trees, a principle which applies as well to the vegetable as the animal world.

If I might be allowed to offer my opinion on the subject of taste, I cannot help thinking that if all kinds of trees were to be planted in groups of different sizes, each sort by itself in the same plantation, it would afford a more pleasing variety than the indiscriminate mode of mixing trees promiscuously, and perhaps turn to much more advantage to the proprietor in the end; as most kinds of flowers have a more pleasing and grand effect when planted in beds, or a considerable quantity of each sort together, than when scattered at random one amongst another.

But of all trees that overtop and outgrow the others, the poplar appears to have the ascendancy, and therefore very improper to be planted among others of a humbler and slower growth; for before some of the others have taken to grow, they will be 7, 8, or 10 feet high, of course they must overtop and spoil all those that are near them; besides they are of no value till arrived at a great age and size, and perhaps not of much then.

Therefore, if any gentleman wishes to

have a plantation of very tall trees in a very short time, he cannot do better than plant poplars; but by no means to plant any other kinds with them, except perhaps larches, to draw up tall and slender, for some purposes they might be wanted for. A few groups or groves of poplars, near or at a distance, round a gentleman's domain, will have a good effect, and make a pleasing variety; but if they are planted as nurses to other more valuable trees, which are designed to remain for ornament and future grandeur, it is going the very wrong way to work, for they are sure to retard and check the progress of other trees of slower growth, such as oak, beech, and Spanish chesnut, (which are certainly the most useful and ornamental) by drawing them up weak with naked stems, which will make them very unsightly in ornamental plantations.

I have lately seen a striking example of this at Lambton Park in the county of Durham, the seat of J. G. Lambton, esq. where the plants are crowded in at from 3 to 4 feet apart, with a great proportion of poplars and elms; after growing a few years the side-branches are cut off close to the stem of all the kinds, without taking any of them out, whereby they become tall slender plants with naked stems; and, as I have before shewn, it retards their increase in girt, and at 20 or 30 years growth they will be nothing but tall, naked, slender, stunted, and unsightly trees, where it is evident, ornament, blinds, and shelter are designed, or required; but which will be certainly frustrated by the mode at present pursued there, if it is persevered in.

To those who plant, or make the holes for the plants by the hundred, and to the raiser of forest trees for sale, such a system of close planting is very beneficial. Not so to the proprietor, who is doomed to a great and unnecessary expence, and, what is still much worse, to severe disappointment and chagrin, on finding, in a few years, all his hopes frustrated by an erroneous and pernicious system. But to see the contrast between such plants, and the oaks and other plants, of only 12 years growth from being planted, it is only necessary to walk through the Chopwell plantations, a view of which would convince any one, more than the greatest multitude of words, of the truth of my observation.

CHAP. IX.

Undergrowth for corf-rods, and other purposes.—Thinning the oak stools in coppices.—Remarkable size of some whins.—Causes of the larch failing, and not thriving in wet cohesive soils proved, also upon dry soils abounding with whins, &c.

As corf-rods are very profitable articles as an underwood in some parts of the country, it will be proper to say something upon that subject. I have before stated, what has been made from a small portion of land on these grounds, and what may be derived by proper management, without materially injuring any other trees that are among them.

The hazel, oak, *Prunus Padus*, hagberry or bird-cherry, and the mountain ash, are esteemed the best, but the hazel has the preference; the birch will do if cut and used in the Winter months, but does not work well in the corves, if dried too much and left till the Summer, therefore it should be cut early in the season, kept by itself, and used as soon as possible; by pursuing this plan, I have sold great quantities that must have been cut down to waste, or if suffered to grow to be fit for pit props would destroy or spoil every other kind of wood among them, and the oak grows well where the birch will; besides as corf-rods are cut every third year, I believe birch will yield more profit in that state than any other. The birch is a very injurious and destructive plant to others, and should by no means be encouraged among more valuable forest trees, as it comes very thick from seeds on land adjoining, where birch has been cut down or is growing, and will soon overtop and smother every thing that is planted where it abounds, except larches or poplars, if it is not cut away when the size of a corf-rod, or sooner if that article cannot be sold.

Instead of planting alder, birch, poplars, and the sycamore as a mixture, if more of the mountain ash, hagberry, and hazels were introduced, where these articles for corf-rods, etherings for hedges, or other purposes, are saleable, a greater profit would accrue to the proprietor than from the others; after the hagberry and mountain ash have arrived to a good size, they should be cut over at the ground to produce straight rods the sooner, or they are apt to form trees.

The hagberry, as it is called in the north, or bird-cherry in the south, is a most beautiful sweet-smelling ornamental tree or shrub; it is usually planted as a flowering tree or shrub in the pleasure-grounds and shrubberies of the nobility and gentry, and it ought to be more general, for the uses I have mentioned; for besides the very beautiful effect it has in the woods in the Spring, its berries would make a bountiful provision for birds, and perhaps pheasants or other game would feed on them; what their principal properties may be I do not know, except that they are of a very astringent quality, and may be useful in a medicinal point of view, if properly analysed by competent persons; the wood, when arrived at a good size, is hard, compact, and heavy, and may be very useful for many purposes, with which I am not acquainted; when young it is extremely tough, makes excellent walking or riding sticks, and is a plant of quick growth, therefore it appears to be of much more value and better worth cultivating than many kinds that are usually grown.

But as oaks make excellent corf-rods, good for etherings for hedges, and various other purposes when young, besides the value of the bark, why not plant more oak than is generally done, instead of so many of those inferior kinds of trees, as the oak is hardy, and will thrive and flourish in almost any soil or situation if properly treated?

There has not been any thing planted here with a view of that kind, except a few thousand hagberries I have digged up and planted in some moist situations, as an experiment to make these woods as profitable as I possibly could, without injuring the oaks; the hagberry seems to thrive and flourish in a moist situation, but it also grows well in a dry one.

When oak coppices or young oak trees

are cut down, great quantities of young shoots are produced from the *stools*, as they are generally termed; when, after a few years, it is customary and proper to go over them and thin some of them out, reserving from 3 to 5 or 6 of the straightest and best placed ones upon a stool for stores. By taking the slender upright ones from among the stores, the greater part of them will make excellent corf-rods, which more than pay the expence of thinning, and leave a great profit.

When the middle ones are taken out, the stores are properly thinned for the first time, suppose in 6 or 7 years from the cutting; after the middle upright ones are well thinned out, there remain a great number of weaker ones growing in an horizontal direction near to the ground, which successively every 2 or 3 years will turn to great profit for corf-rods, (if profit is a desirable object,) which are far superior for that purpose to the upright ones, for by growing slower they are tougher, and it gives an opportunity of going over the stools the oftener, to correct any casualties that may have occurred among the stores, from winds or snow breaking them down, which is often the case, or to cut away the thorns, briers, &c. that may be doing hurt, each time paying more than the expence, and should be kept in view where profit and utility are the main objects; besides these horizontal side-shoots by no means injure the stores, but may very probably greatly benefit them, by absorbing more of the gases that are produced from the decaying leaves and vegetable matter of the former year's growth, which may be conveyed by the greater quantity of leaves the shoots produce to the roots, strengthen them, and part reascend with greater vigour to the central stores. At any rate if it cannot be proved that they do harm, it must be very wrong to cut them out prematurely, at a very great expence, without deriving any benefit whatever, and sacrificing all those profits and advantages; I have mentioned this circumstance, because there are some persons who will have them all cut away at the first thinning.

I have before stated, when speaking of planting the wet ground in Dean Forest, how the larch and other trees died in the Spring months, and the method I recommended of raising the holes with a good square turf or sod of earth, and laying the ground dry at the same time and partly by the same operation, and what a beneficial effect it had in such soils.

From the experience I have had, since I came to Chopwell, of planting larches in such wet places, and particularly if the under stratum is clay or inclining to clay, or the soil of a close adhesive nature, without taking care to lay it dry by draining, which will be very expensive in such kind of land, as the drains would require to be so very numerous. By the method of raising the holes or places where the plant is to stand, the draining may almost be accomplished by that operation, except some of the principal ones, which need not be so numerous if this method is adopted. But to plant larch in such land without laying it dry by perfectly draining, or raising the places where the plants are to stand with soil, it would be far better not to plant any larch at all, as I hope to shew by what has occurred here; oak, ash, elm, &c. will live and thrive after some years, but the larch is certain to fail without that precaution.

When I arrived at Chopwell, in the Autumn of 1819, there were three farms to plant, containing near 400 acres, which had not been farmed in the best manner, with a good deal of wet land upon them that had not been drained, and the ditches were all nearly choaked up for want of cleaning out, which made the ground nearly in the state of an open common or fell.

A very considerable part of the land was overrun with whins or furze, of an extraordinary growth; and having had instructions from the commissioners, that every kind of work was to be done in the most economical and cheap manner, and to sell and make the most of every thing that could be sold and turned into money, towards defraying the expences attending the clearing, draining, and planting the ground; and as there were great quantities of these strong whins, with a few rejected small branches of oak, that had been cut down to clear the ground, to fill up the vacancies with larches, I was told nothing could be made of the whin stalks, &c.

However, as the stubbing and clearing the ground of them caused great expence and left no profits, and having received the orders as before stated, I thought it my duty to make inquiries how to dispose of them so as to gain something towards defraying the expence of clearing the ground, and I sold as many of the strong stalks of the whins that were burnt into charcoal, (which answered some purposes very well) as amounted to £44 4s, and from the offal small wood to £11 4s, making a sum of £55 8s; after paying all the expences of dressing the stalks out, burning and delivering it to the forges, it cleared £20 towards the other expences, where there would not have been a shilling made; besides affording employment to a number of poor people, and work was very scarce in this neighbourhood at that time. From the whin stalks and some other things I made about £90 that season, where there would not have been so many shillings towards the expences of preparing the land for planting.

It perhaps may be interesting or amusing to many persons, who never saw such furze or whins, to state the size and extent of some of the latter that I measured, which may surprise and give an idea of what state part of these farms were in at the time they were to be planted; one whin stalk measured nearly 8 inches in diameter, 23 inches in the girt or nearly 6 inches the square, and another 21 inches in girt, which spread out into great arms or branches like a little tree, with nearly a foot of wood in one of them.

I also measured the extent of ground another whin bush had covered, and all from one original root; it was 9 yards in diameter, and nearly of a circular form; as the branches had extended themselves they had taken fresh root in the ground, so that it took two men a full hour's hard work to grub it up by the roots; the whins in some places were 8 and 9 feet high, and broom in a very few years will get to that height if close together. It would seem superfluous to ask, what chance have small plants that are perhaps from 3 to 5 or 6 years before they begin to grow, even in more favourable situations? I would ask, what chance have plants of any kind to grow among such shelter as this? Yet, strange as it may appear, there are people who maintain that it is necessary for shelter, and that the plants grow the better for it!

But to return—About 200 acres were planted in 1820, and that being a favourable year the larch plants succeeded very well, except in some particular places where the ground was wet, and had not been sufficiently drained and laid dry; this was planted the one half larch, one fourth oak, and the rest a mixture of plants, alder, ash, beech, elm, and sycamore.

The next year (1821) the commissioners ordered an alteration to be made in the following proportions, for the land to be then planted, nearly 180 acres, viz. one half oak, only one fourth larch, and the rest with the mixture as before stated. But 1821 proving a very dry Spring and Summer, with some sharp frosts in the Spring months, nearly every larch on those wet parts died, and those which did live made but little progress in comparison with what the plants had done the year before. It was thought the larch seemed too thin, not considering the real causes of its appearing so, and it was ordered to mend over all the failures of every kind of plants with nothing but larch, which was accordingly done; but 1822 proving a very dry season also, with some sharp frosts in the Spring, those used in mending over failed again in the wet places and from the same causes, and those planted in 1820 appeared better by two years' growth than those planted in 1821, even where they had taken upon the dry ground; which shews what difference there may be between one year's planting and another, even where the land is of the same quality.

The failures have been mended over three times since they were planted with nothing but larch, and in every year they have failed, though the last two years were favourable seasons to fresh planted trees; yet nearly all the larch died in those wet parts, besides great quantities on the dry good land that have been destroyed by the overgrowth of whin, broom, brier, birch, and other rank herbage.

The larches that have been used on this last planted ground in the 4 years, and which was planted at the first with only 680 plants less per acre than the original complement of one half larch, make 1470 upon an average to the acre. As very few of the oaks or other plants have failed from the wetness of the land, except what have been smothered or destroyed from other causes, I would ask what has become of all those larches that have been planted, when it is clear there has been a considerably greater number than were upon the first planted grounds? Yet this year (December, 1824) it has been thought proper to plant 100,000 more larches upon about 170 acres of this thinly planted land, being the fifth time of planting it with larch in 4 years, and there have been planted this fifth time on some of the wettest parts near 1000 larches to an acre; on an average with these last there have been planted upon this ground upwards of 2000 larches per acre in the 4 years. Surely there must be some other cause of their being too thin besides planting only 680 less per acre at first than the original complement of 1360 to an acre; on some parts, where they took kindly and have not been injured or destroyed, they are thick enough.

I shall now endeavour to explain the real cause of such a deficiency, the means of preventing those losses, disappointments, and extra expences; and to caution gentlemen who plant for profit or pleasure, to inquire into and ascertain the real causes of such failures from practical and experienced people, or they may be easily led into fresh expences, without being any nearer their object.

There have been provided, in the nursery at Chopwell, to supply and fill up all vacancies that may occur, after Mr Falla had completed his contract, and the larches have been thinned out, 245,000 oaks, 11,000 Spanish chesnuts, 10,000 ash, 5000 elm, and 5000 spruce and Scotch firs, making a total of 276,000, or 345 plants to an acre on an average for 800 acres; as there may be about 100 acres of old wood land that requires none, and in all probability these will be found insufficient. Surely the knowledge of such facts as these should induce every proprietor to take every possible precaution to insure the success and well-doing of the first planted trees.

Having previously stated that some seasons are much more unfavourable to newly planted trees than others, which was the case in 1821 and 1822, which killed nearly all the larch in the wet parts that had not been sufficiently laid dry; it is well known that such soils when soaked with water all Winter, and as late as May in this country sometimes, when it sets in dry the soil gets hard, contracts, cracks or opens, and lets in the air to the roots, and by absorbing less moisture from the atmosphere than those soils that have laid dry all the Winter, the sharp frosts and cutting easterly winds that generally prevail at that season in all probability kill them, the larch coming so early into leaf before it can have made any fresh roots; in fact, how can larches make any roots when they are sodden all the Winter with water, and the dry weather sets in all at once when the earth becomes of a sudden quite hard, dry, and unfit for any newly planted trees to vegetate in it? Such appears to be the cause of the plants dying in such soils in that state.

But this very soil, where the plants have so often failed, if it lies dry all the Winter, is not so subject to contract and crack when the dry weather sets in, and the larches are preparing to make fresh roots before the trying season (April, May, and June) arrives, when the frosts and cold winds prevail, and the soil, from the action of the atmosphere, pulverises and closes about the roots the same as if they were in the driest grounds.

Unfortunately, I have not had presence of mind to try any upon holes raised here, but I am certain of its effects; because on the tops of the ridges, or by the edges of the drains where the soil has lain dry all the Winter, the plants have succeeded; and in the next row, where the water has lodged all the Winter, the plants are dead; although, in as much and as good soil, I have counted 16 plants of larch of the last year's planting all dead in a single row of about 150 yards long. The method of planting here, by taking only a small spit of earth out with a spade of a semicircular form, and putting the plant in the hole under that one sod, is rather against the plant succeeding, particularly so in those sodden stiff soils, because it will naturally contract when it becomes dry, and let in the air to the roots before they have taken hold of the ground; and also, if the plants are large with great roots, as part of the roots are doubled back in the planting and remain out of the ground, which was the case with part of these last planted larches. I believe, before the end of the ensuing Summer, there will not be one in ten alive of those planted, where they have failed four times before; but time will try it, and it would be a fortunate circumstance if those should die where they have been planted in drier ground, close by the side of an oak, ash, or elm, or at the most within 2 feet of one.

Some of these plants are just starting to grow very vigorously, therefore it must be evident if the larches live they will destroy or injure the oak or any other plant, or must be cut out before they can be fit even for a hedge-stake, consequently the expence attending such a work must be superfluous. A considerable quantity of the small oaks or other plants must have been destroyed, as they could not be perceived at that season of the year among the long close grass, whins, and other filth, by the planters, who performed the work by the thousand.*

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* Since writing this, my predictions have been verified, as I suppose there is not one in 100 alive in the wet cohesive land, and very few in drier land, from the other causes specified.

I had written the foregoing observations on the causes of the larch dying, when I was induced to reconsider and try if possible to ascertain the real cause of the larches so frequently failing in such land; a circumstance which I believe I have been so fortunate as to discover, and which I consider of very material importance to communicate to the public, and to guard gentlemen who plant from falling into such errors, being certain, from what has so often happened before, that these last planted larches had no better chance to succeed than the first, but rather a worse, from being such large plants, and such as but few people would have planted, particularly in such land.

About the middle of March, after the plants had begun to protrude their buds and look green, I was induced to pull up some of them in the wet ground to examine them, when I found all the roots quite black and decaying into the very stem; although the stem and leaves were fresh and green, and seemingly in a very promising state; and now (in the middle of

April, 1825) they have the same promising appearance, and the leaves considerably advanced in growth, although the root and stem, even to above the surface of the ground, are quite dead. This fact is new to me and may be to others; and as this has been a remarkably dry Spring, it may be called an unfavourable season to newly planted trees. It might be said that the dry weather has killed the plants, when the real cause is quite the reverse, having been killed by over much moisture to the roots long before the dry weather set in.

I had fortunately planted a few larches upon some raised turfs in parts of these wet places, which roots at this time, as well as those upon the dry ground, are fresh and vigorous, and will be a striking proof of the superiority of that mode of planting upon such sort of soils,* or of deferring the planting of such parts till late in the Spring; for I have observed larches growing with great vigour in land much wetter than that where the plants have so often failed, and in this ground where any of the plants that stood a little drier and were not killed, and whose roots are in the same soil, are growing very vigorous, while it kills those that have been taken up out of a dry rich soil, and planted before Christmas into soils where the water stagnates most of the Winter; but where it does not appear to stagnate, and where the soil is of a very strong cohesive nature, the roots of the plants have decayed in the same manner; in some only the lower parts of the roots decay, and that part which is above the level of the water remains alive, and enables them to make a few fresh roots near the surface, which barely keep them alive for some years till they have made more numerous roots, from which cause it is thought they are sickly and will not thrive in such soils.

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* In the middle of August, after an extreme dry and warm Summer, I must remark that nearly all those planted upon the raised turfs are alive and in a growing state; although the plants I used had been some time planted in the wet ground, as I did not take them up and replant them till some weeks after Christmas.

The wet does not appear to act so upon the roots of the oaks taken up and planted in the same soil and time, which proves what I have before observed on this subject, and one very important lesson may be learned from this fact. If the land is not sufficiently drained or laid dry, by raising the places where the plants are to stand, not to plant such land with larch till late in the Spring; but when it can be done earlier and all at the same time, it can be accomplished much easier and at less expence, than going twice over the same ground; besides, as the larch is a tree that vegetates so early, it does not appear to be a plant to be left till late in the Spring before it is planted out for good. We have planted them with great success on some raised holes in Dean Forest, late in the season; but they had been taken up in good time, and laid in the earth *by the heels*, as it is generally termed, before they were planted.

Another circumstance this fact corroborates is, that the sap does not retire to the roots in the Winter season, as sufficient is left in the stem and branches to keep them alive for some months, and to vegetate when the roots and parts of the stem are quite dead, as exemplified in this instance of the larches.

It also proves another circumstance of great importance to all planters, and ought to be kept in mind, that the roots of newly planted larches will decay by remaining in a dormant state all the Winter, in land soaked with water, or of a strong cohesive quality, which they must be in after removing till they have made fresh roots.

The knowledge of such facts as these should make gentlemen consider well the experience, principles, motives, interest, or connections of those in whom they confide, and to whom they often surrender their own judgment.

Another cause of so many larches failing, on the very best and driest land, is from the overgrowth of the whins and other rank herbage, that have not been cleared away from them; this stuff, growing so close together, gets up in height, overtops and shades the plants, which in a year or two are totally killed or spoiled, because they are deprived of the power of increasing their leaves and branches, nor can the leaves perform their functions in the shade, or without that light which nature has so liberally assigned them.

I have noticed one particular instance, corroborative of what I have been explaining, which I think it right to state in this place; on a particular spot of dry rich land, more than an acre that had been overrun with some of those strong whins before alluded to, which had been cleared and the whins burnt upon it, and had a single ploughing about 8 months before it was planted, but no crop taken from it, the land as good as any upon the farm, and planted in the usual manner with the other land. On a part of this the soil was taken off to the very gravel before it was planted, and on this part the larches and other plants that were first planted are all alive, healthy, and vigorous, particularly the larch, which is upwards of 6 feet high; whereas upon all the other part of that rich fine land there is scarcely a plant to be seen, having been injured and killed by the close rank whins and other herbage, which have completely prevented the plants from making either leaves or branches; but where the soil was taken off there could be little or no grass or whins for the first year or two, and there the plants are alive, and growing vigorously, as before noticed; but such is the case in all places abounding with an overgrowth of whins, or any thing else that excludes the light and room from the plants to make leaves and branches. But as this case was so striking, I thought it of importance to mention for the information of gentlemen who plant, and who might think such stuff necessary for shelter, and doing no hurt to the young plants, to shew the errors and wrong ideas they may conceive or be led into, if not well understood or inquired after by themselves, and to convince them that merely planting and then leaving them to chance is not the most beneficial way.

I have frequently seen, and noticed in this work, that the plants may all be destroyed in the second or third year after planting them, and if they are suffered to remain in that state (vainly hoping to see them get above it) any number of years, say from 10 to 20, then instead of having plantations in the state I have shewn it possible to have them, they have the mortification to see them overrun with useless stuff, or with a few ill-formed crooked trees, the land to clear again and plant afresh, after the loss of so much valuable time.

I have dwelt particularly on this subject, because I have met with people who possitively assert and maintain that what I have shewn to be so injurious and destructive to plants is in so many ways necesssary for shelter, and that they thrive the better for it.

It might appear unnecessary to allude to such evident facts, because I need only appeal to any person, who has an onion bed or a field of turnips, what sort of a crop he would expect if he neglected to weed his onions or thin out his turnips, and that at a very early period; when he came to look for his crop at the end of the year, he would find himself miserably disappointed. Just such is the case with forest trees; but, as I have observed, there are people who maintain the contrary opinion, and say that the plants will get up through all the stuff that overhangs and shades them; here and there a plant may get its head above it, but look at it when the stuff is cleared away from it; a tall dwindling crooked thing, without any side-branches, and unable to bear its own weight, and is what may be termed *top-heavy*, has to be cut off at the root, and the ground to be planted over again to fill up all vacancies, or have the ground only half stocked, which is a great loss; I said half stocked, perhaps not a quarter, and all for want of a little care and expence during the first few years after planting; for, as Dr Franklin expresses himself, "all is lost for want of a little care at first;" and about what? Why a thing as simple as the horse-shoe-nail!

To prevent loss and insure success to those who plant, either for pleasure or immediate profit, (and most people who plant, it may be presumed, have one or both those objects in view) I would strenuously impress the necessity of laying the ground dry, where it is necessary, by draining and raising the places where the plants are to stand with a good sod of earth, as I have before pointed out, which will cause the ground to be much drier, and will be done at less expence than digging the holes previously; the success will be certain, and no time lost, as is the case when the first planted trees fail; because those used in the filling up of vacancies can never have so good a chance as the first planted ones, nor put in at so cheap a rate, owing to the grass, rank herbage, and other stuff increasing in strength every year after land is enclosed for planting; therefore the first expence is always the least, if well done.

Where the land is sufficiently dry and proper for planting, the only thing necessary at first is to beat down or cut away the grass, &c. from around each plant, wherever it is likely to overgrow and shade it, or grows so close that the plants cannot make side-shoots and leaves, till they are out of danger; and to attend to shortening the long straggling branches, and keeping them to one leader, as before explained. By such care and management it is impossible to calculate the amount of the early and certain advantages to be derived from the practice here recommended.

CHAP. X.

Distances to plant trees—Spoiled for want of pruning, as well as by injudicious pruning—To prune the young plants in the nursery and plantations; the Summer and Autumn seasons the best—Trenching ground for plantations—Account of trees, their increase in bulk in a given time, endeavoured to be ascertained—Spanish chesnuts thrive in high and cold situations—Further remarks on the food of trees—How increased in bulk—Sap remains in the branches all the Winter, proved.

Respecting the distances for planting forest trees, there is such a diversity of opinions, it is not necessary to say much on that head, as every person who plants, must or should act upon his own judgment; but if care is not taken to relieve them from the encroachment of each other, or to take them entirely out before they injure or destroy each other, (which will happen before they are of any or little value) it would be the safest and cheapest way to end on the sure side, by planting moderately thin.

It may not be amiss to observe, that when oaks, elms, beeches, or chesnuts have plenty of room, by not planting too close at the first, or by timely taking out the nurses, or other trees, that they may be equally spoiled and rendered useless for want of pruning, by running all to branches, as well as by that erroneous and disgraceful method of cutting all the side-shoots off at the bottom, and then suffer them to run into any kind of top afterwards; but pruning is thought necessary, and it must be done, because somebody else does it, and by persons generally who know no more the nature or reason of it than a child, just like the story of a sheep jumping over the battlements of a bridge into a river, one went first, and the rest all followed to their destruction.

It is of great importance, and attended with beneficial results in many ways, to prune young forest trees in nurseries before they are taken up for planting out for good, as it can be done more expeditiously, consequently cheaper, if it is thought necessary to prune them before they are replanted in the plantations; but what I chiefly allude to is the acceleration of their growth in the nursery, by shortening in all the strong side-shoots, and not cutting them clean off as some do, reserving the strongest and most central one for the leader; this work should be done in the Summer months when the shoots are young and tender, when it can be done by pinching the ends of the young shoots off, increases the leaves, causes the plants to increase wonderfully in thickness and height, and by the multiplicity of leaves increased this way it shades the ground, keeps down the weeds, and operates as a vast saving of expence to those persons who think it necessary to their nurseries of young plants to be clear of weeds, as a person who understands it could do a great deal in a few hours, and I do not exaggerate when I say that nearly the produce of two seasons will be gained by it.

Never in the course of my professional experience did I ever see such improvements in the growth of plants as in the Summer I adopted this plan, to the oaks and chesnuts that I pruned in this manner, as well as to the plants that were planted out in the young plantations. By doing it in Summer, the Winter pruning becomes unnecessary, and there are no shoots to pick or rake off the ground; but if it has been omitted in Summer, it must be done in the Winter, and continued every Summer and Autumn afterwards to the strong and straggling side-shoots, for the oak and chesnut generally make two and sometimes three shoots the same year, one in the Spring, and another after Midsummer or in the Autumn; a person will perform a great deal more of this work in Summer than in the cold Winter days, and the advantages of pruning at that season are very great if duly considered.

As vast sums of money are often expended in trenching the ground and making holes for planting, which might deter many from the attempt who have but little money to spare for the purpose, and who think the plants will not succeed without such preparation, by digging a hole and putting a plant in (if not too large) at the same time, and keeping the grass-side uppermost, particularly if the ground is wet, answers the same purpose as making great holes before the time of planting, as oftentimes a very large hole is made for a plant with a very small root; but which ever way is practised, the work should be well performed. Therefore, when there is no visible advantage, the most expeditious and cheapest method ought to be adopted, where the saving of expence is an object.

Trenching the ground, no doubt, is of considerable advantage to young plantations, if they are regularly attended to for some years afterwards, to keep down any weeds and filth that may get up, by hoeing or any other method; but as it is attended with a very serious expence in the first instance, and a continual one afterwards, if kept clean as it ought to be, to derive the supposed benefit from it, otherwise the expence would be thrown away. There are but few persons who can adopt that plan to any great extent, and a good deal of damage is often done to the plants by the hoeing, and growing of crops among the plants where that is adopted, as the crops if luxuriant will have the same effects upon small plants as weeds and other filth.

For shrubberies and small plantations near to a house, where a plantation is required quickly, it may be necessary; but by following the plan I have recommended and pointed out, would obviate all this useless and additional expence, if proper care is taken for a few years at first to go over once or twice a year, as occasion may require, to beat down or cut away all grass or other rubbish from around each plant, and to give an occasional pruning when necessary. If the ground should be hard or very steril, to put a little better earth to the roots of the plant at the time of planting, to facilitate their establishment in the ground, which is of material importance, would save a great expence, and in most cases answer the same purpose.

It seems to be the opinion of many persons, in the counties of Durham and Northumberland, that the Spanish chesnut will not thrive in so cold a climate, except in particularly warm situations; but I shall here mention a few instances, that have come to my knowledge, where they have throve, and perhaps they may in other places similarly situated, if fairly tried.

In Gibside woods is a Spanish chesnut, by the coach-road-side, which measures at this time (1824) at 4 feet from the ground, 7 feet 2 inches in girt; a very fine tree, but it has been evidently crowded in its early growth. There is another near the chapel, which measures, at the same height, 7 feet 3 inches in girt.—In the same woods are some silver firs, probably planted at the same time, by the coach-road-side, that measure, at 4 feet from the ground, one 8 feet in girt; another, near to the stables, 8 feet 3 inches; and another, down one of the avenues in a moist soil, 9 feet girt. These trees are upwards of 100 feet in height.

There are also beeches, planted at the same time, supposed from 90 to 100 years since, when the grounds were laid out by a Mr William Joyce.

A beech near the chapel measures, at 4 feet from the ground, ...	8 feet girt.	
One by the coach-road-side, ...	8 ft.	9 in.
Another near to it, ...	8	5
And one near the monument,	8	6
An elm near the lodge, ...	7	1
And an English elm, at the east end of the terrace near the hall,	8	8
A larch, probably planted at the same time, near the stables,	7	4
A Scotch fir, near the stables,	7	7
Another do. do. ...	6	10
And another do. do. ...	6	6

Also several yew trees, that must have been planted when the grounds and walks were laid out, which measure in girt from 2 feet 9 inches to 4 feet 6 inches. There are some oaks, that appear to have been planted when the other trees were; one measures in girt, at 4 feet from the ground, 8 feet 3 inches, another 8 feet 4 inches.—These trees are the finest of their kinds, and had not been so much crowded as some of the others, which are in consequence drawn up tall with but few branches, and are not near the size in girt.

Respecting the exact time these trees were planted, I have endeavoured, by every means in my power, to ascertain the fact, both from Mr Ralph Fenwick, the present steward for the Gibside estate, and from Mr John Stanley Joyce, nurseryman in Gateshead, the latter of whom is at this time upwards of 70 years of age, and grandson of the before-mentioned William Joyce, and from several others. Mr Fenwick thinks they have been planted only about 80 years, as he informed me there are two silver firs at Streatlam full as large as those at Gibside, which are known to have been planted about 80 years since. But Mr Joyce appears to make it certain they must have been planted upwards of 90 years; so that, perhaps, it might, from the various accounts I have heard, and from the best conclusion I can form from them, reasonably be supposed they have been planted about 95 or 96 years.

There is one silver fir, in the west plantations at Gibside south from the chapel, which I have ascertained for a fact to have been planted in 1761, the year of a great riot at Hexham, particularly remembered from that event, and which at this time measures, at 4 feet from the ground, 6 feet 6 inches in girt, has been planted 64 years, and has increased in girt rather less than an inch and quarter a year on an average for that period.

Respecting the growth of the Spanish chesnuts, Gibside may be considered a favourable situation, and particularly as they had been sheltered by other plants when young; but, I have been informed, there have been finer chesnut trees cut down there than any at present standing in those plantations.

There is now growing at the Leases near Gibside, belonging to John Scaife, esquire, a Spanish chesnut, at the outside of a narrow belt of trees, fully exposed to the west winds, and partly under the drip and shade of other larger trees, which measures, at 4 feet from the ground, 4 feet 6 inches in girt; it is a healthy fine tree considering its exposed situation.—An ash near the house measures, at 4 feet from the ground, 7 feet in girt; an elm 6 feet 10 inches; and a beech, in the hedge-row adjoining the turnpike road, 6 feet 6 inches.—These trees have been planted about 75 to 80 years, from the best information I could get.

Upon Tanfield Moor, a much higher and bleaker situation than either of the former, there is now growing, in a narrow belt of plantations near a farm-house called *Barker's-Close*, a Spanish chesnut, planted in the year 1777; a fact of which I have no doubt, as I had the information from the person who held the plants when a boy at the time of planting; it measured, in the Autumn of 1824, at 3 feet from the ground, 3 feet 3½ inches in girt; so that, in 47 years, the time it must have been planted, it appears to have increased nearly 40 inches in girt; an amount little less than an inch per year, and truly wonderful for so exposed a situation. In the same place are oak, beech, elm, and larch trees, but this chesnut is as good and healthy as any of them. The soil is of a cold and wet nature, and the whole plantation is not much more than a quarter of an acre, and 22 yards in width.

The tender shoots of the chesnut, in high situations, are not so liable to be killed by the Spring and Summer frosts (which often happen when the plants are making them) as they are in lower, damp, or moist places. From whence it appears that the Spanish chesnuts will thrive in much higher and colder situations than has been generally imagined, particularly if they are sheltered in their infancy by other plants.

From these facts it will appear that the oak, chesnut, ash, beech, elm, and silver fir, will increase in girt from about an inch to an inch and a quarter per year on an average of 100 years, if they have sufficient room to make branches; for the trees that I measured were the finest and largest of their respective kinds, and had never wanted room for their branches to spread freely; whereas those, which have not had that advantage, do not arrive at near the size. The Scotch and larch have not attained the thickness of the silver fir and some other trees, yet the yew appears to increase in size about half as fast as the other kinds of trees; and it seems to me tolerably clear that very small young trees will increase more in girt in one year than those at a more advanced age. But these experiments I have not attempted for a sufficient length of time to be assured of the fact; nor have I yet been able to ascertain how much a tree, from 50 to 100 years growth, increases yearly; but from what I have proved by the experiments it appears to me pretty evident that they grow fastest when young, some of the oaks having increased from one inch to an inch and a half, and in one instance 2 inches in girt in one year; and one of the larches with shortened branches increased, upon an average of 4 years, very near 2½ inches per year in girt.*

The large oaks, on the Crown estate at Chopwell, are of about 55 years growth, and as all the timber at that time was cut down to the size of a small pit-prop, nothing of much size or value was left standing. I have measured about 60 trees of various sizes and situations, and have found the best and largest of them, where they appear to have had room and a considerable quantity of branches, to measure, at 3 feet from the ground, from 4 to 5 feet in girt; only 3 among them have exceeded that size, one 5 feet 3 inches, another 5 feet 5 inches; and the largest, which is very remarkable as growing from an old stump of a tree, is 5 feet 10 inches in girt. But the greater part, where they stood thick and have not made many branches, are considerably under 4 feet, and a great many only 18 inches and upwards to 3 and 4 feet in girt; but I must observe, that many of the thickest trees are as tall as those of the smallest girt.

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* The larch is more liable to disease from blights at various ages than any other of the forest trees with which I am acquainted, and will hardly ever recover, (like the oak and other of the hardy deciduous kinds) if severely injured, without the aid of pruning by shortening the branches; which operation will not succeed but upon young trees, consequently it appears that larches are not well adapted for permanent woods. They soon get to a great size, and are fit for numerous purposes, if they keep in a growing vigorous state; but as that is very uncertain, it would appear most prudent to turn as many as possible to advantage at the earliest period they would pay best, and before they become in a stunted state, and injure, by remaining too long in the ground, trees more hardy and useful.

This must shew, in a strong light, the utility of thinning woods in proper time, and that on an average, if oaks have sufficient room, they will increase about an inch or a little more in girt a year; and, by neglect or mismanagement, may be retarded so as not to increase little more than a quarter of an inch a year, as is evident from the growth of these oaks.

It surely must be an error in practice to cut down fine young thriving oak timber from 40 to 50 years growth, and increasing in thickness at the rate of an inch or more a year, to clear the ground to plant it over again with larches, particularly where oak timber of larger dimensions is required, to take out the stunted bad ones without branches, when there is no probability of their making fresh ones, or where they are standing too thick, in all these cases it is very well; but to cut all down indiscriminately at that age and size, when in as healthy and thriving a state as timber can be, because it may be supposed or said to be in a stunted state or have done growing, must certainly be a fundamental error.

In a plantation, belonging to the Gibside estate on Tanfield Moor, I found an oak that measured, at 3 feet from the ground, 14½ inches, another 15, and one 17 inches in girt, which have been planted 21 years on as cold, black, moory soil as can well be conceived, the land producing a long moss and coarse heath. The oaks and sycamores appear, now that they have taken to the soil, to thrive better and look more healthy and vigorous than the larch, which in such cold wet situations appear soon to turn mossy and stunted; and in another plantation, on the edge of Tanfield Moor above the Leases, belonging to the Marquis of Bute, the land dry but fully exposed to the westerly and north winds, I measured an elm, at 3 feet from the ground, 2 feet 1 inch in girt, an oak 18¼ inches, and an ash 16 inches, which have been planted 20 years. These were all by chance, as the plantation had not been properly thinned.

Having had some conversation with a farmer in the neighbourhood of Chopwell about cutting off oaks at or near to the ground in 2 or 3 years after planting, if they appear in a stunted state, he told me of some he had cut off belonging to his landlord, William Surtees, esquire, in a plantation belonging to that gentleman at *Buck's-nook* in the county of Durham, which were upon a bit of as bad wet land as any in the plantation. He cut them off, as he informed me, to observe the effects, without taking any notice of it to any one at the time. From the great progress those oaks had made in comparison with the others, I was induced to go and see them; when I measured three of them, at 3 feet from the ground, one was 21¼ inches, another 19¾ inches, another 19¼ inches in girt, and which had been planted only 20 years. On other parts of the plantation, where the land was much better but which had been overrun with whins, &c. there was scarce a plant upon it of any kind but what was small, ill-formed, bad things. The oaks were scarce so high as the whins, and the larches were crooked and good for nothing; in short, it wanted clearing and planting over again, after the loss of 20 years. On the contrary, where the oaks had been cut off and no whins to impede their growth, there was a great quantity of tall fine larches, many of which had been taken out at different times, but still they had been left too long before they had been taken out, as most of the oaks were tall and slender; those I measured seemed to have had more room from the greater number of branches they had on them. In a plantation adjoining, belonging to another gentleman, and which had been planted

7 years longer, we could find no oaks near the size of these, as the larch and other wood had not been thinned out in time.

These facts corroborate, to the fullest extent, what I was premising from the experiments I have made. The instances quoted were by chance, as no particular care was taken or means used to accelerate their growth, except the mere cutting the last-mentioned oaks off the second or third year after they had been planted, and never doing any thing to them afterwards, except taking a few of the larches out can be considered such.

In 20 years from the planting, with early care and proper management, a gentleman may look forward to have oak, ash, and elm trees from 20 inches to 2 feet and upwards in girt, after taking out a crop of larches; for here is an instance of an oak, in 20 years, upwards of 21 inches in girt, and an elm of the same standing 2 feet 1 inch in girt, without any care or means used, and in unfavourable situations as to soil, &c. Then, in more favourable situations, with care and skill in the management, is it not probable these sizes may be far exceeded in the same time?

In a plantation, belonging to the Gibside estate, are some oaks and larches that have been planted 19 years; a striking example of leaving the larch trees too long before they are taken out, by which they are drawn up tall and slender, and the oaks are rendered small stunted, weak, dwindling plants, not near so good as some on the Crown wood-lands at Chopwell that have been planted only 11 years.—And in a plantation belonging to the Greenwich Hospital estate, are some more oaks that have been planted under a thick shade of larches several years after the larch had been planted, and have had their lower branches cut off; but as the larches are so thick and tall, and the branches meet above the oaks, it is impossible the oaks can make any progress till the larches are mostly taken out, so as to admit *light*, that most essential requisite to the growth of plants, besides the injury the oaks must sustain from various causes in the cutting down and getting such tall trees from among them.

I have mentioned these places, as being in this neighbourhood, that any gentleman might see the difference betwixt those plants and some in his Majesty's plantations at Chopwell that have had a different mode of management; because the fact of actually seeing such things is more convincing than mere theory, or the opinions and assertions of people without experience or judgment, however rich or great they may be.

I hope, from what I have proved and endeavoured to explain, that I may be the humble means of inducing those gentlemen, who have planting in view, to think of the immense profits which may be derived in their own life-time, in behalf of their children and descendants, as well as to the general good of their country, by attending well to early care and skill in the management of their plantations and woods.

For the practice of cutting oaks off at or near to the ground I am no advocate, having observed some in a clump near the house at Gibside that had been planted and part of them cut off at the ground (evidently an experiment) by the late Earl of Strathmore, when I found that the oaks which had not been so cut off were by far the best and most likely to remain so; however, by cutting them off near the ground in cold, wet, or poor dry land, where there is no rank herbage, and when the plant is clearly in a hide-bound stunted state, in which case it will undoubtedly answer a very good purpose, as the plants will gain several years growth by it, which is certainly of great importance; and as oaks are often 6, 7, and sometimes more years before they begin to grow to make any progress, where the herbage or other impediments are rank, I would prefer cutting off at 2, 3, or more feet from the ground, according to the age and size of the plants, near to a good bud; or, by pruning the top well in if it is bushy, and making a slit through the bark with a knife the whole length of the stem up one side, a young shoot will be produced from that height as well as from the bottom, and stand a much better chance than a young tender shoot to escape all the injuries they are so subject to among rank weeds.

I have seen the oak make great progress by cutting the tops well in after being in a stunted state for some years, when the tree is almost sure to throw out strong and vigorous shoots. But still, even after this operation, it will be necessary to go over them to select one of the best shoots for a leader, and to shorten the strongest and longest of the others a little by just pinching off the ends of them, for they are very apt to throw several strong shoots of nearly an equal size after being cut off, which causes them to grow bushy or shrub-like, and all the hopes from this mode may be disappointed for want of proper after-management.

Pruning, scarifying, or making a slit with a knife through the bark of the stem and along the main branches of stunted trees, may probably have a similar effect upon them as the letting of blood upon diseased animals; indeed, I have experienced instances of the wonderful effects of this process upon various kinds of fruit-trees, by cutting a slit up the stem and along the principal branches, where the bark appeared hard and hide-bound, causing them to make vigorous wood when they had not made any for several years before. It is a common practice upon stunted and hide-bound cherry-trees, and may be performed with the greatest safety and beneficial results upon the stocks and branches of apricot and peach trees, whenever they appear in a sickly state; and there can be little doubt of its efficacy upon some kinds of forest trees; but not having as yet tried any experiments by slitting the bark upon stunted oaks, I cannot speak with certainty on the subject; but with respect to pruning the heads of stunted oaks well in, I have long practised that with great success.

I have before supposed, from my own observations and reflections, as well as from the experiments and remarks of others, that it was very probable, if not certain, some plants, if not all, might derive a great part of their nutriment from the atmosphere by their leaves, and that the stem of the tree is increased by the elongation of the *caudexes* of the leaf or leaf-buds; but finding some gentlemen of a contrary opinion, and who think that the stem is increased by the ascent of the sap or nutriment that is derived by the roots from the soil, I shall just mention one fact, which clearly proves a tree to be increased from the leaves and branches downwards; but before I state it I will take the liberty of just making a few remarks that occur to me on the subject. We see nothing on the roots of plants, similar to the leaves upon trees, to draw or absorb nutriment out of the ground; now I would ask, are the gases afloat deep in the earth similar to what they are in the atmosphere? I should think not, nor can it be fairly supposed or proved that the gases or vapours in the atmosphere, in dry hot seasons and climates, penetrate through the dried and parched earth and rocks to the extreme fibres of the roots of forest trees, to be sent up again to the leaves. We often see the oak and other trees growing with the greatest vigour, when the ground they grow in is full of the roots of all manner of under-growth, and when their heads are above it and full of leaves. What dew or moisture can descend through all that thick and apparently impervious shade and cover to the roots of all these plants, to supply them and the huge oak with sufficient nutriment to support them all in vigour through the hottest and driest Summers, such as that of 1825?

It is generally supposed that the sap descends from the branches to the roots in the Winter months; an opinion which I believe to be erroneous. I would rather think that it remains in the branches and roots all the Winter as well as the Summer; and that from the want of leaves and heat during the Winter it continues in an inactive, dense, and dormant state; for, when we cut branches or young shoots from trees in Winter, they are as full of sap or moisture as in Summer, only not in so fluid a state; but even that may vary, according to the state of the atmosphere.—If the sap were to retire from the branches to the roots in Winter, the branches would soon shrivel up and die from the action of the frost and winds. When we take cuttings from trees in the Winter months, and plant them in the earth to propagate, how could they grow if there was no sap in them? And it is well known the bark and young roots are emitted downwards, which must be from the sap in the cutting. Some kinds of plants will not strike roots from cuttings if they lose their leaves; the *Erica* tribe is an instance of this, and there are very probably many others.

In the first week of November, 1819, I cut some grafts or scions of apples and pears, packed them in moist moss, put them on board a vessel, and did not receive them till the 16th of March following, when I stuck them in the ground with an intention to graft them that season; but, for want of stocks and other causes, I omitted grafting them, left them in the earth, and supplied them occasionally with a little water through the following Summer, to try if any of them would strike root, not wishing to lose the kinds; but none of them made any. In the beginning of April, 1821, some of them were still alive, which I grafted upon the branches of apple trees and upon some pear stocks, and had the satisfaction of seeing several of them grow, and which have since borne fruit. Here then is an instance of cuttings having been 17 months cut from the parent trees, nearly 5 of those months out of the earth, and yet they retained sufficient sap to unite with the stocks; but when this and similar facts are seriously considered, it appears wonderful how we should suppose the sap retired to the roots in the Winter season.

But to return to the fact I have alluded to, the increase of the stem or trunk of a tree; having last Spring, some time after the tree was in full leaf, cut a ring of bark about $\frac{3}{4}$ of an inch wide, from the branch of a vigorous young pear tree to cause it to make fruit buds, I have measured it since the leaves have fallen, and the upper part above where the bark was taken off has increased full half an inch more than the plant below; it is only a small branch of a young tree planted in 1820, which appears to me clearly to establish it as a fact, that the stems of trees are increased in size from the leaves and branches above, in some way or other. But let any gentleman or experienced gardener look at his peach and apricot trees which are budded upon plum stocks, how often will he see the part above the union of the bud of the peach and apricot as thick again as the stock? arising, no doubt, from an obstruction at the place of union of the peach and plum, and of the elongation of the *caudexes* of the leaf or leaf-buds (which are the rudiments of the future young shoots) meeting with a closer and firmer medium to pass through in the stock below than its own open and more porous nature, shewing the utility of making a slit up the bark of a stock, and which clearly demonstrates that the stems and branches of a tree are increased in thickness by the leaf and leaf-buds.

It therefore appears certain that whatever can increase and keep them in a healthy and vigorous state (which cannot be without room and the free admission of light and exposure to the sun's rays) must be of the utmost importance to the quick growth of forest trees; consequently whatever tends to lessen, injure, or prevent a plant from increasing in leaves and branches, with the benefit of light and the sun's rays, must injure and finally kill it, if deprived of it too long, which I think must be self-evident to any one whose mind is at all open to conviction; and of what I have been endeavouring through this essay to prove, and of the vast importance of attending to these facts by all who have plantations of forest trees, or may have any in contemplation, as I have fully shewn, that, with a little care, skill, and expence bestowed upon them in their infancy, they will soon be amply repaid.

If what I have stated should be the means only in a small degree (which I flatter myself it may) of correcting any of those errors or neglects in the management of woods and plantations that are prevalent in so many places, by introducing a better system, or stimulating others to improve it, I shall be much gratified, and might be induced to make further experiments, if I should have opportunity and means, towards furthering so desirable an object to landed proprietors and the country at large.

CHAP. XI.

Experiments upon fruit trees—A cheap and ready prepared plaster for the wounds of trees—New sort of crooks or nails for wall-trees.

Having arrived at Brocklesby, the seat of the Right Honourable Lord Yarborough, in the county of Lincoln, about the middle of June, 1800, I found the peach trees in a most deplorable state, with scarce a leaf upon them, but few branches, and very little fruit; the few leaves that remained were all thick and curled, or diseased with mildew and insects, and which soon after mostly shrivelled up and fell off, if not previously pinched off with the finger and thumb, particularly the thick crumpled leaves.

The trees were not very old, but had extended and covered a very fine wall without flues. The situation of the garden was a very unfavourable one, being both low and very wet, as the water used to stagnate and cover a great part of it through the Winter previous to its being made into a garden; but it had been drained at an immense expence, and fresh soil brought in to form the fruit-tree borders and other parts deficient; but, after all, the situation could not be improved by the great expence, which would not have been necessary in a more favourable site, nor the ill consequences entirely prevented to vegetables, and particularly fruit trees, in a garden in so damp an atmosphere from the exhalations that arise in such places, particularly in the Spring months, when sunny days and frosty nights are so prevalent.

The fruit-tree borders had been well made, with good soil, and properly drained; the trees had grown luxuriantly and covered the walls, but still no fruit of any consequence, nor that well flavoured, neither of the wall-fruit nor other kinds.

These wall trees (peaches, nectarines, and apricots,) would make efforts in the Spring of each year to produce wood and leaves; but when the cold weather prevailed in May and June, with easterly winds and frosts, the leaves became diseased, curled up, and were to be pulled off, or would fall off in June or July. At this time the trees became in an inactive state, when they should be making and perfecting the wood for the next year's crop; but towards the Autumn, when the earth was become dry and warm to a great depth, they would make fresh efforts, and throw out plenty of strong luxuriant shoots; but the early Autumnal frosts would set in before such late-made wood could be half matured, so that through the Autumn and Winter the greatest part of these strong shoots were killed, and the others had not time to make strong flower-buds to produce fruit; so that season after season returned, and nothing but disappointment to the proprietor, after all the immense expence in the garden establishment, with bare walls, and naked unsightly trees without fruit; but this is often the case, when gentlemen give up their judgment and plain common sense to the opinion or will of some man who has got a great name in his profession, and is supposed to know best, therefore it must be as he dictates, without any further consideration of the matter; but such persons generally find their greatest interest in the most money that is expended in these concerns, or the length of time the works are in executing, because in this case a worse natural situation near to the place could not have been chosen for a garden. It is easy to say, If it is not a good one we will make it so, (at a great unnecessary expence) but we cannot alter Nature, however we may assist her.

Instead of recommending to cut up and root out these sickly and half dead trees, and to plant young ones in their places, (that I might have the pleasure of having trees of my own planting and training, under my own discipline or management, and I was very young at that time) as I knew it would be a long time before there could be any fruit from young trees, I was induced to reflect and consider what I could do to bring the present trees to bear a little fruit, till young trees could be brought into a bearing state between the old ones, as nearly all the old trees were destitute of young wood half the height of the wall.

In the Autumn of the year 1800 I commenced servitude with his Lordship as gardener. I began with what I shall term *raising* the roots of some of the peach and apricot trees, (for the apricots were in as unfruitful a state as the peaches from the same cause, a late over-luxuriant growth, &c.) The method I devised and adopted I shall describe and explain as clearly as I can, with the beneficial results that accrued from it.

I began by digging a trench at from 4 to 5 feet from the stem of the tree, and about 2 feet wide, to one half of the tree first, digging down till I found the roots, which were at the bottom of the good soil, and near 3 feet below the surface, which had been occasioned probably by planting the trees too deep at first, and always digging and trenching the borders deep, which forced all the roots so much below the surface; but I must remark, I found all the roots in a very healthy and vigorous state, which shews that the annual disease in the branches and leaves had not affected the roots, nor had the disease in the branches been derived from diseased or cankered roots, even in that damp situation. After all the earth was dug out of this trench for half of the tree till we got below the roots, we carefully forked the soil from among them with a three-pronged fork into the trench, and threw it out till we had got one half of the roots bare to about 18 or 20 inches from the stem, when we lifted them all up and bent them back, if not too strong, or held them up while we filled the hole with the soil that had been thrown out in clearing the roots to within 9 inches or a foot of the surface, treading it down well that it might not afterwards subside, and let in the roots deeper than I intended. I then carefully replaced and spread the roots upon the soil, covering them with the remainder, without adding either fresh soil or manure of any kind; when finished, the roots lay within 9 inches or a foot of the surface, instead of being, as they were before, 3 feet below it.

But as the trees had been planted very deep at first, or fresh soil with manure added, in the course of years the soil in the borders had been raised, and after I had performed this operation the roots were deeper in the ground by several inches near the stem than at the extremities. My reason for doing them this way was to prevent too great a check by an entire removal of such large trees, as I left what may be termed a *good ball* at each tree, at the bottom of the stem, undisturbed; but I took care to hollow it well under, so as to get at and raise up every root that went perpendicular from the stem into the earth, and laid them in an horizontal position with the others, or if too strong to bend upwards, as some of them were, I cut it entirely off; but preferring raising them up and laying them in an horizontal position, with their extremities rather the highest than otherwise to prevent them making fresh roots downwards, wishing to encourage the roots as near the surface as I could, conceiving it more beneficial to the trees and fruit; I never suffered the borders to be dug afterwards more than half a spit or 9 inches deep, my main design being to have fruit as soon as possible, and of a good quality. When I had done one half of the roots, I proceeded and did the other half in a similar manner; this prevented the tree from being entirely unnailed, and from settling deeper than it was before, while the one side was doing the other kept it in its proper position; this operation was performed upon all the peach and apricot trees, but not in one season, as it was only an experiment I was trying; some of the trees were very large, particularly the apricots; of those done in this manner the first season, the next year I had the secret pleasure of seeing them making the most promising and healthy shoots, from about 9 to 12 or 15 inches long, without any of those thick curly crumpled and mildewed leaves with insects, &c. The first shoots and leaves that were made in the Spring were not injured, but continued healthy and vigorous all through the Spring and Summer, perfected their wood early in the Autumn, and were full of fine blossom-buds for the ensuing season, and what fruit appeared this year was earlier by three weeks than usual, had an excellent flavour, and equal to that on a hot wall.

The following year, from the luxuriant bearing wood made this year, I had plenty of fine fruit, early and well flavoured; and as I did not think quite so much of fine formed trained trees, pruned and nailed according to the rules of the art, as of seeing a wall well covered with branches, leaves, and fruit in the season, when the owner expects to find something more substantial, I trained the shoots the trees had made in any direction I could lay them, so as to cover the bare wall; for when the trees are in full leaf and plenty of good flavoured fruit, the proprietor seldom looks or inquires how the tree is trained. After the first year I had profusion of peaches, nectarines, and apricots, large and well flavoured, more than could be well consumed; which was often acknowledged by his Lordship, and some of the old servants that had been in the family ever since the garden was first made, who all allowed they never had such plenty of fine fruit before, even when the trees were in their full prime.

I tried the same experiments upon various other trees of different kinds, and planted a variety of young fruit trees on variously prepared bottoms to prevent the roots going too deep, with a view of getting better fruit in such an unfavourable situation, where nearly all the first planted fruit trees had failed, had become cankered and were cut down, or had never produced any fruit good for any thing, or ever fit to send to table.

I had intended, after the roots had extended over the prepared bottoms, if the roots got too deep into the damp wet bottom, and should grow too luxuriant, and not produce and ripen the fruit in perfection, to have shortened or raised the roots to the outsides of these prepared bottoms, which were generally 4 or 5 feet in diameter when in the borders, and the same size for the half of a circle when against the walls. I had them formed of such materials and thicknesses that I conceived the roots could not penetrate through them into the crude damp earth underneath, and placed the roots in such position, by leaving them as long and laying them as horizontal as possible at the time I planted them, and by taking special care not to dig deep around the tree, as far as the prepared bottoms extended each way from the stem. The bottoms were generally made with broken tiles, bricks, stones, or with the slags out of the stove furnaces or fire places, all broken small, rammed down quite hard, and covered with some lime cramps, with about a foot in thickness of good soil over them, elevated a little in the centre.

But just as I had completed my works, and laid the foundation for my future improvements and further experiments, one of those whims, occurrences, or perhaps all-directing circumstances that happen in a person's life-time, but which it is not material to state, induced me to quit that situation, and leave all the honour of my 6 years' labour, improvements, and experiments, to be reaped by another.

The latter experiments I had tried, and laid the foundation to try further upon, had not had time to develope themselves, (except upon a few young pear trees against the walls, which were answering the expectations I had previously formed,) at the time I left his Lordship's service, so as to enable me to state any satisfactory results from them; and I should feel ashamed to state any thing as a fact, that I was not convinced of in my own mind; although, had I continued the management of those trees for a longer period, I might have been able to have given much more interesting information on the nature of fruit trees in such unfavourable soils and situations; but having never seen the place since I left, which is nearly 20 years, nor heard or wrote to make any inquiries concerning the fruit trees, I cannot at present say more about them; but if ever fate, chance, or any cause should enable me to visit that place again, to see and learn the effects of what I had laid the foundation, if I should think them of sufficient importance with the other experiments I am now trying or may hereafter try either upon fruit or forest trees, I should be happy to communicate that information for the good of the public; but in case it should never be my lot to publish any thing more, I shall insert one other piece of information which has come to my knowledge.

A great deal has been said and written upon plasters and compositions for the wounds of fruit and forest trees, which I have tried, and been at some trouble in collecting and preparing the stuff for them, but never found much good from the various nostrums. The cheapest and easiest to be procured and applied, perhaps the most durable and efficacious that I know of, is fresh cow dung alone in a thin state, taken when the cows are at grass, or when fed upon other green or moist food. This can be procured any where, and laid on with a thin piece of wood, chip, or any other thing, and as thin or thick as might be judged necessary; by laying it on at two or three different times, it is astonishing how fast the young bark will grow underneath, and effectually exclude the air and moisture. I have known it continue more than a year, the time since I first tried it, and it appears as firm and close as at first, and will do so till the young bark forces it off. This could be easily renewed upon the part that is still to heal over, if the wound is large and it should be thought necessary. Whoever may try it will soon be convinced of its utility and efficacy; it is nothing the worse for being simple, cheap, always at hand, and readily prepared where cows or young cattle are kept. I believe it might answer for grafting instead of clay; or when buds are inserted in stocks, in dry hot weather, a little put about the bud, where the bandage cannot cover, might prevent the air getting in and killing the bud before it has united with the stock.

Any one who pleases can try the experiment; or it might be applied with the best effects when the outer bark is taken off hide-bound trees, according to a recent method, or when a slit is made up the stems of any kinds of trees to relieve them, or to any other wounds upon trees where the bark has been displaced by accident or design, or decayed by canker or any other cause. It appears to me the best thing that can be applied to make the young bark grow, and to hide the wounds and unsightliness of them at first, by keeping them from being so powerfully acted upon by the sun and drying winds It only wants trying to convince any one of its utility; and if a cheap and convenient think is desirable, here is one always at hand.

Knowing well the value of time and expedition in business to an industrious and anxious gardener, who has so many important matters to attend to at the same and at all times, and which will not admit of delay without discredit and vexation to himself, with loss and disappointment to his employers; knowing also the importance of wall trees being kept in good order at all times, and the length of time it takes to prepare shreds to nail and unnail trees; I have been induced, from the suggestions of a very eminent man, (not a gardener) but the worthy and celebrated Mr Bewick the engraver of Newcastle, to consider if any method could be discovered to expedite and make cheaper, easier, and more durable and effectual, the operation and method of fastening the branches of trees to garden or other walls, for the saving of time and labour is a saving of expence. On this subject I am sorry to differ in opinion from Mr Bewick, but from the nobleness and candour of his sentiments I know he will readily excuse me, because real utility and benevolence to his fellow creatures form a conspicuous feature in his character. I shall just state Mr Bewick's opinion, which gave rise to what I have to suggest upon this head, viz. to have crooks of cast iron driven into the wall at certain distances, or, if the walls are to build, to be fixed in at the time of building, and the branches to be fastened to them with tarred twine, or rope of a proper thickness, something like net work, from crook to crook, or one branch fastened to another where the crooks are not thick enough. I state this for the consideration of others, who perhaps may see it in a different light from what I do; for, as Mr Bewick most justly observes, "If we cannot accomplish or bring to perfection what we wish or think it possible to be improved or brought to greater perfection; yet if we can but stimulate others to think, and try experiments upon those subjects, a material object in point of great good is obtained and accomplished."

My principal objections to the tarred rope are, its relaxing and contracting, according to the state of the atmosphere; the difficulty of tying or piecing the rope-yarn when it breaks, or becomes necessary to cut or unfasten it when a branch is to be cut off and taken away to be placed in a different position, or a tree is to be removed, with several others needless to mention, all of which must be apparent to a practical gardener.

After a good deal of consideration and trials, I have hit upon a method, which in my opinion, aided by some experience, will, I think, save the preparation, trouble, and expence of shreds, and answer every other purpose as well or better, and which I shall with diffidence take the liberty to suggest to the consideration or trial of any one, who may be disposed to make the trial or pursue the inquiry further. It is, to make nails with crooks to them, if I may be allowed to call them nails, as the appellation or term *nailing* trees would be difficult to change; the part that is to be in the mortar should be square, the same as a common wall nail, the other part made round and turned with a crook, but so made as to drive in the wall, or pull out with a hammer when necessary, the same as a common nail; by making the part square that goes in the mortar, it can be drove in any direction for the crook to suit the position of the young shoot or branch to be fastened to the wall, and by the other part being made round there will be no danger of the shoot being injured by the crook; they might be made of various sizes to suit different walls, or sizes of shoots or branches, from that of a small common wall nail for fine brick walls, and small shoots to any size for larger branches and old brick or stone walls. Between the end of the crook and the wall, when it is drove in, there should be a space left if possible, when the branches or shoots could be put in or taken out generally, without drawing the nail or crook, which operation of frequently drawing the nails out of the wall injures and defaces the wall more than any thing else. This is deserving of serious consideration and reflection, to the proprietor and gardener, in many points of view, both as to the expence of frequently pointing old walls, and the trouble and difficulty of fastening the nails in such decayed mortar. I find, by using these crooks, I can fasten 3 or 4 shoots to the wall in the time I can fasten one with a nail and shred; which is certainly of great consequence, where there is much nailing and but little assistance.

Trees look very unsightly when shreds are not neatly cut, both as to length and breadth, and properly placed on the shoots, and frequently the blossoms and fruit are spoiled under them if not timely removed, (which is additional trouble) and it is thought by some that the shreds encourage and harbour insects, earwigs, spiders, woodlice, and some others. They no doubt do, but the crooks would not do that, nor spoil the blossoms or fruit, as the crooked part need be no thicker than a common wall nail; besides, I think trees would look much neater without shreds.

The only objection I see against them at present is, if they are made of wrought iron by nailors, I fear they would be too expensive to come into general use; but I have been informed that cast iron will not rust so soon as wrought or common iron, and that it can be tempered so as to be nearly as tough as common iron. If that is the fact, then they would come cheap, and I think would be a desirable acquisition to gentlemen, gardeners, and others who have walls and nail their own trees, both as to neatness, and a saving of money as well as of time.

APPENDIX.

Having never entertained any idea of publishing an account of my experiments or remarks on the foregoing subjects, or any other, till late in the Autumn of 1824, I might perhaps, with more time and opportunities, have made those remarks of more importance or presented them in a better style ; I might have been more accurate in some matters that I have related, and have produced others which are entirely omitted.

I was anxious, for particular reasons, to have the work completed by the end of the year, and to have put it to press early in 1825; but from various causes (which perhaps it is not necessary to state) delays and disappointments occurred, which caused it to be deferred till the Summer of that year before it was attempted.

In the mean time, various new facts have arisen and come under my observation, and more experiments have since been tried, which have had the effect of throwing some new light upon several subjects which I could not embody in the work, because some of them were not known to me at the time, and did not immediately occur to my mind, or were omitted altogether from the hasty manner in which I was at last compelled to finish the work. Some of the fresh matter I have embodied as notes in the margin, but the principal additional matter I must present to my readers by way of Appendix; and when it is considered under what circumstances the facts were collected and composed, with my inexperience in compiling or writing a book, may apologise for any unconnected parts of the work that may be discovered by the discerning public.

Having before treated of the different causes that injure and destroy plants when young and small, what I have since discovered or have omitted to state of the destructive nature of the field-mouse, I trust will not be uninteresting or useless. From what I have before said concerning this little animal, and have further now to state, I must for once turn advocate for the poor hares and rabbits, as these facts must in some measure free them from part of the blame that is so often attached to them, for it is a hard case, even when innocent, to be only suspected of crime. From my experience I have found the mouse a much more destructive animal than either of these. I discovered, in the Spring of 1825, that the mice had become again extremely numerous, and their ravages not only great to the oaks, &c. but, what is very extraordinary, extended to the resinous trees, particularly to the larch, in all places where there is plenty of shelter for them, either of whin, broom, grass, or any thing of the like nature. Their depredations have been very extensive to the larches, but more particularly among the whins, as they afford both food and more security to the mice when at their mischievous work, where great numbers of larch plants, from 2 to 3 feet high, have had all their side-branches and a great many of them the leading shoot entirely bitten off by them, leaving nothing but the lower part of the naked stem. It is really surprising how they bite off and appear to feed upon the small young shoots, and astonishing to observe how they have got so high as 3 feet or more up the stems, and to near the extremities of the side-shoots of the larches that are among the tall whins, to bite them off and carry them into heaps under the trees and whins, where they appear to have been bitten again into shorter lengths. To the naturalist this might be very interesting and amusing, and afford him further means to ascertain and describe their nature and properties.

There have not been many spruce firs planted in these grounds, but I have found one small spruce fir growing among this thick pernicious stuff, that injures and destroys plants in such various ways, for want of clearing away in proper time, completely barked all round, 6 inches from the ground, and the side-branches and leader bitten off, with some others of this kind injured similar to the larches. I must remark that I have found only a few larches completely barked all round like the spruce, but great numbers partly barked and much nibbled into the very wood. The shoots were generally bitten clean off, laid in heaps, and re-bitten into shorter lengths; whether any or how much of the wood was eaten I cannot tell, having never seen them in the very act; but such a fact probably might be ascertained, by having some or perhaps only one of these creatures in a box or cage; (for they devour each other when confined, even the very young ones are guilty of it when put up together, as I found from experience, by having some very young ones taken out of their nests and secured some time as food for a hawk.) But there can scarce be any doubt of their feeding upon the young wood, only it appears curious to find so many of the short lengths left; perhaps, as they cannot eat it all at once, they may be dainty where there is such plenty and variety, and may like to have it fresh.

They are not only destructive to young trees, but extremely so to wheat and grass, and probably to all corn; but I will only state what I know to be facts. I have found very great damage done to the wheat adjoining the plantations long before the grain was ripe, and continued to the very time of reaping, having found immense quantities of the wheat stalks, handfuls in a place, particularly where the grain was strong, some nearly rotten and some quite fresh at the reaping season, which proves they must feed upon the stalks long before the grain is ripe, even before it is in flower; I have observed the same in the stalks of the cocksfoot grass, (of which they seem particularly fond) as soon as the flower stem is advanced to some length, as there is more saccharine and nutritive matter contained in the stalks than the leaves.

A person, who has been in the habit of gathering the seed of the cocksfoot grass for some years, was surprised to find but very little this year where there used to be plenty, not even worth his trouble to collect, and as the mice are so very numerous, from what I have observed of the wheat, and the stalks of cocksfoot grass, as well as several others, I have not the least doubt but the mice have destroyed it, by feeding upon the flowering stems, as I have frequently found handfuls of the remains of the stalks at and near the roots or tussocks of that kind of grass long before it was in flower or the seeds ripe.

These observations may escape the notice of the farmer, or the persons employed in cutting down his wheat; but let any one examine carefully his corn fields adjoining to plantations, or where and when mice abound, he will find it too true, to his great loss. They seem also to feed largely upon the seed heads and leaves of the narrow-leaved plantain, having found handfuls of the stalks bitten off into short lengths, and laid into heaps under the larches, and the seed heads eaten; even the *Centaurea Nigra*, or knapweed, the strong stalks of this they bite off, and feed upon the seed heads; indeed there seems but few of the grasses or field herbs but what they feed upon. Their burrows or runs into and under the dead and lodged grass, whins, broom, and into the earth, and so frequently seeing them run in and out, have, comparatively speaking, very much the appearance of a rabbit warren.

I omitted to state, when speaking of the mice caught in the holes dug in the ground, that they were generally found dead, as it appeared they very soon died, either through fear or by beating about to get out again, or perhaps from both these causes combined, and that several were caught in the holes when partly filled with water, but not brimful, as in that case they could have got out again.

It would also appear that they congregate together at times, as I have often found great quantities of their dung, sometimes in round and oblong heaps, and on bare places under the young larch trees and whin bushes. But I will now leave this subject, to be further considered or investigated by the curious inquirer and ingenious naturalist.

SECTION II.

On cutting off large, broken, or decayed branches—Remarks and experiments on applying fresh cow dung to the recent wounds of forest and fruit trees.

When I first began to write upon this subject of plantations, I did not intend to have said any thing upon the treatment of trees in an advanced stage of growth; but, since I finished the former part, I have thought it right, for some reasons, to say a few words upon taking off the decayed, broken, and injured branches close, or not close to the stem, bole, or trunk of large trees when in a growing state; it is thought best, and practised by some, to cut an injured branch off at a considerable distance from the stem, from 2 or 3 inches to various lengths, or not to take a dead or dying branch off at all.

When a branch is broken or injured at some distance from the stem of the tree, and a living smaller lateral branch is left thereon to keep it alive, and if it is not entirely excluded from the light by a great number of branches above, which would kill it, the practice may be very proper, viz. if the branch keeps alive; but when it is injured, split, or riven very near, or into the stem, as it very frequently is in cases of heavy snows and strong high winds, or when there is no living lateral branches left on the part adjoining to the stem which is designed to be left as a stump, then the practice is exceedingly erroneous, particularly if the tree is designed to stand a great number of years afterwards, before it is to be cut down; as I hope to convince any gentleman or practical man, who will take the trouble to reflect and examine into such things themselves, because I have heard it asserted and blamed as an ignorant and erroneous method to cut such branches off close to the stem, as it causes the trees (oaks are meant) to bleed, lets in the wet, and injures the timber, and that those trees which have had branches cut off in that manner, ought, and have been recommended to be cut down, because, as they assert, they are spoiled, although the most vigorous and best trees in the woods. What destruction and havoc would this occasion in young thriving plantations and ornamental trees, after severe heavy snows and high winds, if such notions as these were to prevail, and to be acted upon! Because the finest trees, with the largest and best branches, are more frequently injured from such disastrous causes than a tree that happens to have one or more branches injured close to the stem, (if they should be cut off) must be cut down, or, what would be worse, suffered to grow to encumber the ground, perhaps injure others for a great number of years, and be a useless rotten tree at the last, if the absurd notions of such knowing ones were to be acted upon. But that it is contrary to the truth and facts, I hope to be able to prove, if the work is judiciously and timely performed, for that is of material importance.

Any one who will but observe and examine closely, will find, when a branch decays of itself, if of a considerable substance, or from the injury it may receive from snows, winds, or other causes, that, before the branches are entirely decayed, the stem of a growing tree is increased several inches, which leaves a hole or wound of several inches deep, of quite rotten wood, in the heart of the tree. I have seen holes from 3 or 4 inches to a foot deep, in healthy young oak trees, from the decay of branches not near so thick as a person's wrist; which is evident must leave a space of rotten and decayed timber in the inside of a tree, if the wound should finally close over, which in some cases where the hole is not large it will, which will cause a hidden defect in the timber, and may produce very unpleasant feelings and consequences both to seller and purchaser when discovered. I have frequently observed the bark and young wood swell 6 or 7 inches over, or up the decayed or decaying branches of trees, making strong natural efforts to heal over, which it cannot do while the decaying branches are left on; people need only to look a little at trees, or into woods of a considerable age to see plenty of such instances, and in all such cases that part of the timber must be materially injured, as any person who has the working and cutting up the wood can testify; whereas when such branches are first observed to be decaying or dead, and those that have been injured from other causes were sawn off as close to the stem as possible, and smoothed over with a chissel to take off the roughness the saw occasioned, in a very few years the wound would be completely healed over, without leaving any of those rotten places in the heart of a tree occasioned by the branches being left to decay of themselves, and preventing the young wood and bark growing over those parts.

In a growing tree a wound may be supposed to heal over an inch a year in girt, then a wound of so many inches in diameter will heal over in as many years, and as the bark and young wood protrude over the white sappy part of the wound, first from both sides and downwards, consequently such part as would naturally decay the soonest is secured the first. From this fact *we may see how provident Nature is to preserve every part from injury, and kindly hints her want of assistance from the helping hand of man.*

The heart or hard-wood, which is longest before it begins to decay, is the last part that is healed over. When branches are to be taken off oaks, they should be cut very close, particularly on the lower or under side, as the bark grows but slowly upwards, and very often it decays some inches below the lower part of the wound; and if much protuberance is left there, or on the upper part or sides, it cannot heal over so quickly as when it is cut tolerably close; but that must depend in some measure on the size of the limbs or branches dismembered, because on very large limbs there is often a protuberance or swelling near the trunk, in which case it would not be proper to cut too close, as it would make a larger wound, which would consequently be the longer in healing over, such branches should be cut off where the swelling begins to diminish;

but in all smaller branches without that swelling, the nearer they are cut to the stem the better; any one who will notice it carefully will find that branches so cut off will not retain the moisture or water, and may remain a number of years before they begin to decay, of course the new wood unites to the old, and when the tree is cut up will only leave the wood a little discoloured in such parts; as for the bleeding, there is no such thing in wounds of this kind, that only occurs when trees are injured or split from winds, frost, lightning, or other natural or unknown causes, when the sap will ooze out from such injured trees, as is frequently to be seen.

Having tried some further experiments during the Summer of 1825, to ascertain how much a wound will heal over in a season, and whether the using of a plaster of simple cow dung would accelerate that process, or in what other manner be beneficial to the wounds on trees, I shall state the results so far as the time has allowed me, with some further remarks and observations, which I humbly hope may be of some service.

On the 22d of May, in hot dry weather, I sawed a few branches off some thriving young oaks, and put some fresh cow dung over the wounds of some, and left the others exposed as is common, but smoothed the rough edges off left by the saw all alike.—July 11th, in 7 weeks, examined the wounds, when I was agreeably astonished at finding the bark had protruded above an eighth of an inch from each side, and the top over the wound and a little upwards from the lower part, while those wounds not covered with the dung had made no progress of any consequence, as I could only discern a little effort on one of the uncovered wounds from the side; and in September, the bark had protruded considerably more than a quarter of an inch from each side and downwards, and growing a little upwards from the bottom, without the bark on that part decaying; while those without the plaster have made but little progress, and some of them none at all that is visible. I tried it upon several branches with similar results, and also upon fruit trees, but earlier in the season, and was extremely gratified to observe its efficacious and healing tendency. I have also tried it upon some wounds of 2 years standing, to observe its effects; some of the wounds have healed over full an inch at this time, and this has been a year in which trees in general have not grown so much as in some others, although I have measured and found some of the young oaks have increased an inch, and from that to an inch and three-eighths; young elms, ash, and healthy trees in proportion; some of the larches, that had been blighted, have made but little and some no progress, while others in a healthy state have increased 2 and 2½ inches in girt.

From the experiments concerning the use of cow dung in accelerating the healing of wounds on trees, it appears to have the greatest efficacy the first season, and should be applied at the time or as soon after the wounds are made as possible, and might be renewed when the young bark has forced it off, till the wound is completely healed over; which in some kinds of trees might be more necessary than others, particularly the soft-wooded kinds, and perhaps on none more than the walnut. When it is necessary to prune or cut branches from those trees, as there is a very large pith in the young branches, and the young sap-wood being very soft and porous, and as the pith decays it leaves a great hole which admits the wet, and may be the cause of that valuable wood being so often found of little value, when cut up for use for the wounds of such like trees, the application of it might probably be found of more value than is at present thought of.

Some of the wounds of the oak trees, that were cut off in June and July, 1823, after the great snow in that year, are nearly healed over and all in a very promising and progressive state, without the least tendency to decay of those that were fresh made; but some decaying or rotten branches that were sawn off at the same time have a very different appearance, being decayed into the body of the trees, which must be very striking to those who are open to conviction.

Having observed some spruce firs at Hamsterley, which had some branches sawn off about 2 years ago, at an inch or two from the stem and some even longer, and a composition had been used; I found the bark had protruded and covered the ends of those stumps, which very much surprised me, as I did not think the bark would have covered and grown over them at that distance from the bole; on observing this circumstance, I was induced to try if it would have the same effects upon the oak branches; accordingly I sawed some branches off the young vigorous oaks, at from 1 to 3 inches from the stem, and applied the cow dung at the time, and have found all the stumps dead to the stem; consequently, oak branches should be cut off close to the stem; some branches, which I cut off close, on the same tree and time, and applied the cow dung, are beautifully healing over, others so done but without the application have made no progress. I tried one branch with a live twig on it, at about 3 inches from the stem, and where it was sawn off the stump is quite dead, except a very narrow strip which conveys the sap to and from the live twig; which circumstances prove it best to cut branches from oak trees close to the stem, except in such cases as I have before stated.

In respect to the application of cow dung, or any composition, to the wounds on the resinous trees, I am inclined to think it quite useless, as there issues a resinous matter from between each year's growth for 7 or 8 of the rings or year's growth, which may shew how long the young wood conveys the sap, and which perfectly answers the end by excluding the air from cracking the wood where the branch was cut off, and preventing the bark from drying and separating from the wood in hot dry weather, which is the case with the oak, and other trees of that nature. The great use of the plaster appears in keeping the wood and bark in the same state or nearly as when the bark is on and till the new has time to grow, as the dung is effectual in excluding both air and wet. I have grafted with it instead of clay with great success, and it must be used in a stiffer state than when applied to wounds of trees, because it will not stick on, unless it is frequently applied a little at a time, which would be too troublesome where there is much grafting to perform.

Another very useful and valuable purpose to which the plaster may be applied, and what I have practised with great success is, to heal the wounds and prevent their further decay, on those valuable kinds of apple, pear, and other fruit trees that are apt to canker, by cutting out the decayed bark as soon as it is perceived, and before it has spread all round the branch, for it is like a mortification, and spreads rapidly ; many a fine bearing branch might be preserved and prolonged for years if this was attended to and practised regularly once or twice a year, or whenever such decay of the bark appears, which often begins at a dead spur, or fruit-bearing bud or stalk ; but whether it arises from an insect of the maggot or any other kind as some believe, I shall not attempt to decide, as I cannot satisfy myself on that subject; but on the utility of cutting out the decaying bark, and applying the plaster to those parts, which must be renewed when the new bark has forced it off, to keep the exposed wood from drying too much, I have no doubt, having kept a branch alive all this hot and dry Summer, which had the bark off all round for more than 3 inches, and for 6 inches two-thirds of the circumference, (and only a small branch) by covering it with cow dung; the wood appears quite dry, but if there had been fruit I have no doubt it would have ripened.

When trees are ringed to cause them to bear fruit, or make fresh wood in any part that it is wanted, it is of the utmost importance, by preventing the wood from drying and cracking till the upper and lower branches unite, which might be in 1 or 2 years, at pleasure; by not cutting the ring too wide at first when they have united or nearly so, it can be enlarged by taking another ring from the lower part where they are uniting, till the object is accomplished, whether in making the tree fruitful, or in procuring fresh branches in any part of the tree, thereby preserving the top or branch of the tree so operated upon. When the bark on the cankered branches of apple trees is decayed all round, if not too wide, by applying the dung the branch will be preserved, till the barks unite again, and the form and beauty of the tree preserved, and, what is of much more consequence, the already strong and improved bearing branch, which must be apparent to practical gardeners and others.

It is probable, when felling oak coppices or small trees, if boys or girls were employed to cover the cut stumps with fresh cow dung, it would greatly facilitate their springing from the roots, and prevent the bark (from the heat and dryness of the weather) separating from the wood at the wounded part, and prevent the death of many a root of any kind of trees it would be desirable to keep alive and in a vigorous state to produce future crops, which are more quickly raised from these established roots than planting young trees.

If any of these experiments and suggestions should be the means of causing others to pursue and make further attempts to elucidate so important and desirable an object, I shall feel myself highly gratified.

SECTION III.

On reclaiming and bringing woods and plantations that have been neglected, or got into a ruinous stunted state for want of thinning, &c. into a healthy and profitable condition.

How, or which is the best way, to bring plantations, that have been neglected and in a ruinous and stunted state, into health and vigour again, is a very natural proposition, and has been put even to me, therefore I hope to be excused if I offer a few remarks upon so interesting and important a subject.

Where plantations have been neglected and injured by having been over crowded when young, and where the trees are drawn up tall, weak, stunted, or hidebound, with but very few branches upon them near the top or on one side, the best method of restoring them that occurs to me is, to take out a sufficient number of the fir tribe if there are any, or any other trees of inferior quality and value, to make sufficient space to admit light and room for the injured oaks or other trees that it might be desirable to retain, to bring into a healthy and vigorous state again as soon as possible.

Often have I seen thousands of small firs, that have been overgrown and topped by others, left to rot and decay, that might have been taken out, with the greatest advantage to the proprietor, for many of the purposes I have pointed out, and of the utmost benefit to the remaining best trees that have got the lead, and which ought to be retained, for it is in vain to expect the fir tribe to recover after they have been long in that state; oaks, elms, chesnuts, and some others, probably may by proper means being used, which I shall endeavour to point out. The beech, I believe, is an exception, as I think it will not make fresh branches so freely after being long in a stunted state or under others; therefore I think it should be served the same as the firs.—I shall forbear to point out any instances, as I wish to induce all proprietors to look after such matters, and to judge for themselves.

After a sufficient portion of the useless and annoying trees and other undergrowth is cut down and removed, what can be converted to any useful purpose so as to clear the expence (and if any profit so much the better) or laid upon the ground to decay in such a manner as to forward that operation of nature; if it will not pay for the removal, or might do harm to the plants or trees it is wished to restore to health and vigour, cutting the largest of it to pieces, and laying it near the ground that it might not interfere or injure the fresh branches or leaves of the living plants, supposing oaks are the principal trees to renovate, although the same rules will apply to most other forest trees, except the fir or pine tribe.

After such trees are removed as it is not thought possible or desirable to attempt to renovate, I would begin to head some of them down (the weakest and those with the fewest branches on) to different heights from the ground, and perhaps cut some close to the soil, according to circumstances; but, if there should be much underwood or other cover that would get up quickly to injure the young shoots, I would prefer cutting them off at a considerable height from the ground, and make one or more perpendicular incisions through the bark with a knife, or any proper instrument, the whole length of the stem. Trees of 20, 30, or even more years' growth, might probably be renovated, and set in a growing vigorous state again, which would be of immense importance. If they are thought too thick to head off, to cut out a ring of bark all round the stem (an operation which must be performed when the sap is in motion) at any height the proprietor or operator might deem most eligible, and the ring of bark to be from an inch to 2, 3, or more in breadth, to allow 1, 2, or 3 years before the disjoined barks unite again; for, perhaps, the first year it might not be able to make fresh strong shoots below the incision, but in the second or third it might; for we should not be discouraged if Nature does not operate so quickly as we wish, for there are many intricacies in her works which we cannot unravel.—By applying the cow dung where the bark has been removed and heads taken off, as explained in section 2d, will keep the head alive, and prevent any injurious effects to the wood till the barks and young woods unite.

If this method should fail, it will at any rate have the same effects as heading them off, for the plants are sure to make wood below the circular rings, and the dead tops could be cut off afterwards, but it would be more troublesome after the young shoots are made. At the time of ringing trees of this age and size, I would make the perpendicular incisions through the bark from the root to the ring, and perhaps, in some cases, extend it above the rings. This Summer I have made a single incision as high as I could reach up the stems of a few stunted oaks of 50 years growth; one of the trees has swelled an inch in girt, the others not so much, therefore I can say no more on the subject till further experience, only that the incisions are united with fresh bark, and the heads have made no young shoots this year, the leaves having been injured by a species of caterpillar early in the Spring.

Where there are healthy branches on one side of a fine young tree extending a long way from the stem, which is very often the case where plants have stood close together and have had only one side towards the light or open space to extend its branches, then it would not be amiss to shorten those branches in nearer to the stem, to prevent them hanging down, or from being blown about by the wind, always to where there is a living sprig or small branch; and, by taking out a ring of bark half way or nearly all round the stem, leaving only a little bark on one side to insure the life of the head, and always applying cow dung, will very probably cause it to throw out strong shoots on the side destitute of branches, where the ascending sap is checked, to the support and increase of the stem, as we have seen that trees cannot increase without branches.

I have practised this method, with the greatest success, upon fruit trees which have had branches on one side only, and which have formed fine healthy heads, for producing young shoots or wood on the naked or destitute part of the stem or branches of trained trees; and I have no doubt of its efficacy on several kinds of forest trees, particularly the oak and Spanish chesnut.

These hints and observations I intend principally for the consideration of those gentlemen who have woods and plantations in such a state (of which I fear there are too many) to induce them to consider and try a few experiments of this sort, and to be convinced before they give their fiat to have trees of 30 or 40 years growth cut down as unreclaimable, perhaps to plant the ground over again with inferior sorts, which may in all probability be smothered or injured again in a few years and in the same manner as I have often witnessed.

As, according to our criminal laws (which it is a consolation to reflect are in a fair way of being revised and improved) many a fine young man has been cut off in the prime of life, who, with a little care and good management, might have been reclaimed and made a useful member of society; just so is it with a young bad tree, which is certainly much sooner cut down than renovated; but *mark*, it takes a long time to rear a young tree to be as thick as a person's arm or leg, particularly where plants have been crowded; consequently, it must be of the greatest importance to the owner to try every possible means to reclaim and bring those established trees into a healthy and vigorous state, before the fatal sentence of extermination is past and put in execution.

Before I quit this subject it may not be amiss to notice, that I have observed the larch and beech much more and oftener blighted or injured by the frosts in low moist situations, than the oak, consequently they are not so proper to be planted in such places; the Scotch and spruce firs, perhaps, would be more proper; the oak and ash will thrive, and withstand the cold and boisterous westerly winds, much better than the beech, or even the larch or spruce firs, after they have got to a good size, of course are more hardy and fit for such situations, and appear in a healthy and vigorous state when the larch, &c. appear to have done growing.

I have observed some oaks to have a fine healthy appearance on a part of Corbridge Fell, where have been originally planted little else but Scotch firs; probably these oaks were planted about 40 years ago, when the Fell was first inclosed; but as the Scotch firs were planted very thick, the greater part of the oaks must have been destroyed; those, however, which I saw appeared healthy and very likely to thrive on such land, especially now that they have had light more freely admitted to them, the greater part of the firs having been cut down where they were growing.

Some think the land deteriorated by producing a crop of Scotch, larch, or other firs, of 40 or 50 years' growth; but I believe it is equally capable of bringing the oak or any other wood to perfection, had such trees been planted at first or any time afterwards, provided they could be established in the ground. How they might thrive in the commencement of their growth on land that has been cleared of firs of that age, and planted afresh while the old roots are decaying, I cannot give an opinion, having had no experience of that kind.—Perhaps putting a little fresh soil in the holes nearest the old root stumps, might be the cheapest method, and greatly facilitate the young plants in striking fresh roots and establishing themselves; a cart-load, from some adjoining land, would go a great way, if the plants and holes were small. This might be an experiment well worth trying, by those who have such old fir grounds to replant.

SECTION IV.

Further remarks on the probable utility of the furze, or whin, as food for various animals.—Shelter, fencing, &c.

Since I wrote the remarks on the whins, at page 14 and 15, I have been at considerable pains to find out a cheap, simple, easy, and effectual method of preparing the young whin for food, so as to be within the reach of the poor inhabitants of those districts where it abounds or might be naturalized, and where other fodder is often both scarce and dear, and to whose use it is most likely to become applicable.

A very ingenious mechanic, a neighbour of mine, Mr Joseph Hepple of Black Hall Mills, who makes the German steel for Messrs Cookson of Newcastle, has tried it upon a machine on the principle of the common malt mill, to bruise it between two metal rollers. This we found answered the purpose in respect to the bruising effectually, except the points of the spines which it would not touch, and which I found would have been tedious and troublesome to the cattle to get in their mouths without pricking them; but the greatest objection was pressing out the juice, which is the nutritive part, and if it was not used immediately it quickly dried, and became little better than straw or chaff, of course that method I could not approve of; but not to be discouraged by a few obstacles, he made me a model of another machine on the principle of the forge hammer, which Mr Bewick, (who is much interested in this matter,) did me the honour to present to the Mechanics' Institute at Newcastle, to see if it could be made more simple, &c. by any of the ingenious members of that useful society. Mr Cail, the secretary, has shewn it to some of them, who think it so simple it can scarcely be improved. But I have been presented with a sketch of another, on the principle of a stamping machine, to be worked by the hand with a windlass in the same manner as the other, to have about 4 stampers or beaters, with or without a knife or knives in each to bruise or chop it, and which move or act alternately one at a time; but I am decidedly of opinion that chopping is preferable to bruising, for the reasons already given. The one with the stampers appears to require more wood and materials in the construction than the other, consequently would be more expensive, and probably sooner out of order and want repairs, which should be avoided as much as possible. The other is to have 3 or 4 knives fixed to or in the head of the hammer or beater, which can be made to strike very quick or slow; however, not having had one of either principle made to witness its actual performance, I have not thought it necessary to represent either by a plate; but Mr Hepple is going to make me one for my own use according to his model, when I shall see the actual operation, and be the better able to judge of its merits.

How the whins act upon horses, in a medicinal point of view, I cannot tell; but I perceived my horse in a fortnight's time, after I commenced giving it to him last Spring, considerably improved both as to condition and vigour, for he had no corn. I thought it caused him to stale oftener, but whether it was so I will not positively assert; I have tried and find pigs will eat it freely when chopped small, by chewing and sucking out the juice, and rejecting the woody fibrous part, similar to what they do with the inside cuticle of pea-pod. This might be of great importance to poor people who can keep a pig or two, and who often find great difficulty in procuring food for them; and it might act as a stimulus in causing them to take other food, and perhaps prevent some diseases they are subject to. However it is not improbable, would some able chymist but analyze its nutritive and physical properties, that the cultivation and importance of the whin, as an article of food for various kinds of animals, may be of much more consequence than appears at first sight, as well as its usefulness for fencing and shelter in enclosing and dividing land, in high, barren, and bleak situations.

I am indebted for some of my ideas on the probable vast importance of the whin in dividing of enclosed lands into fields for shelter, and food for sheep on cold open sheep farms in the north of England and Scotland, where vast numbers are lost in severe Winters for want of shelter and food, to the celebrated engraver on wood, Mr Bewick of Newcastle, who had discovered its use as food for horses, and shelter for sheep in severe snow storms, when a boy, and occupied in looking after sheep on the open fells, and who always found his charge at times under the shelter of some large friendly whin bushes, which would supply them with food when buried deep in drifts of snow till they could be extricated, and who has or had an intention of publishing something on the subject of whins himself. This might be well worthy the serious consideration of those gentlemen who have estates in such districts, as well as to the sheep farmer and breeder of young cattle in hilly or mountainous countries, and other occupiers of land of such a nature and situation, where, by the aid of planting on the poorest exposed parts, together with the shelter afforded from plantations, and this other mode suggested from the whin fences, to check those sweeping cold blasts of wind, snow, &c. so obnoxious to cattle, and detrimental to vegetation. Land at present of little value might, in a very short time, become, I will not attempt to predict of *how much value*, yet I have no doubt it would be greatly enhanced; but this I must leave to be considered and reflected upon by the proprietors of such lands.

I would fain hope some of the gentlemen connected with the enclosing and dividing of Barlow Fell, situate in the parish of Ryton in the county of Durham, will try the whins, if only on a small scale, to enclose or divide some of the highest and exposed poorest parts of it, as an example or trial in this partly hilly and barren country, but where the whin grows with the greatest luxuriance.

SECTION V.

On the fruit of the common bramble—Remarks on the probable virtues and uses of our native fruits and herbs.

Having pointed out the usefulness of the common whin as fencing, shelter, and food for animals, suffer me now to observe that even the poor despised bramble has more valuable qualities than is generally imagined, and what other uses or perfection it might be brought to if cultivated, and pains taken as with other fruits, we can only surmise; but, as I have before remarked, it appears clear that Providence has provided both food and medicine for the several tribes of animals, plants, insects, &c. according to the various climates and local situations on the earth, is it not very probable that the native fruits and herbs of each particular climate are the most proper and best adapted for the sustenance and health of the various inhabitants of it, if the pride of man would condescend to make use of them?

But it is strange that various things are despised or thought but little of, if they are common or easily obtained; even the fruit of the common bramble, generally called *blackberries*, which some people would scarce deign to taste, may perhaps be possessed of great nutritive and medicinal properties, and might well deserve to be analyzed by those scientific men who have the means and abilities to pursue such inquiries for the good of their fellow creatures. Of the uses and probable qualities of this despised fruit I shall state a few particulars that have come to my knowledge, and then leave the subject to be further considered by others more competent.

To the poor in the vicinity of Newcastle it is of great importance, many of whom go a great number of miles to gather blackberries while they are in season, and carry them from 10 to 20 miles, to Newcastle, Shields, and Sunderland, where they sometimes sell them as high as 3d and 4d per quart, for puddings, tarts, preserves, or jellies, and even making of wines to the rich and opulent; for here, where other fruits are scarce and dear, they are thought highly of. By most people the fruit is much esteemed and sought after; by the wives and mothers of the sailors employed in the mighty deep, to send on board the ships, as they are found or believed to be very healthful to the men to eat with their biscuits, as well as for tarts and puddings, much more so than their common fare of salt beef and pork.

All through the season, after the gooseberries are over, (for apples, pears, or plums are often both scarce and dear in this country, and out of the reach of poor people) they are regaled with the fruit of the bramble as the greatest luxury for puddings, tarts, &c. and would probably lay in a store for future consumption if sugar was cheaper, a necessary ingredient to preserve them. There is little doubt but an excellent wine might be made from them alone, or perhaps mixed with currants, both as a nutritive and medicinal beverage for poor or even rich people, much more cheap, wholesome, and grateful than the often adulterated and expensive foreign wines, that are recommended by the faculty in such cases; in fact, when people could make such wines themselves upon the first symptoms of an illness, a glass or two of this simple fluid occasionally given, or the fruit used as a jelly to bread, might prevent or mitigate the attack of numerous diseases and complaints the human frame is subject to; and it is well known that diseases are often suffered to get to a head, or make great inroads in the constitution, before people think of seeking for help; and when the expence of a doctor is thought of, to persons of an honest principle, many a dear and valuable friend and member of society may be suffered to languish and expire for want of timely assistance and nourishing support; but if the medicinal and nutritive qualities of these common productions of Nature were better understood, we should all be induced to imitate the ants and bees, and provide against the evil day.

I knew a lady, Mrs Aufrere, grandmother of the present Lord Yarborough, who was so well convinced of many of the highly valuable properties of this common fruit, that she always had some gathered in the season for preserves, jellies, &c. for colds and sore throats; and I should earnestly hope that the hints here given will stir up others to analyze and study the nature, properties, and uses of the herbs and fruits of our native country, as there is little doubt they are possessed of qualities which are little thought of by the greater proportion of the inhabitants.

In former times when Gerard wrote, and even in our own time as I have witnessed myself, surprising cures have been effected by some simple British herbs, which have been administered by poor country people; but as it is common with great men or regular practitioners to think it beneath them to use these common things, it would be well if men of learning and science would condescend to notice and bend their attention to the subject, it might then perhaps become fashionable to make use of them; then these simple despised fruits and herbs of this country might be found and acknowledged by the reflecting part to have been planted here by the beneficent Author of Nature for the health, sustenance, and benefit of the different orders of creatures he designed to inhabit it, and which some of us presumptuously or unthinkingly too often term *cursed useless weeds !*

Any one who is curious could try a few plants of the bramble in a garden, trained as an arbour, or similar to what I have recommended for currants, and as high as hop poles; of course they, like the whin, will grow where little else can, but perhaps not to bring the fruit to great perfection. I must beg leave to caution the fair sex, if they should chance to eat any of them in puddings or tarts, that they will certainly discolour their teeth and lips, but I have the consolation to add that it will wear off much sooner than an ill name or report.

The *Vaccinium Myrtillus*, bilberry, bleaberry, or whatever other provincial name it may go by, appears to possess a large proportion of saccharine matter, and an excellent wine might be made from it, nearly equal to port, by the aid of sugar, as they ripen at a season when the sun has the greatest power in this climate, which is perhaps of very great importance to the strength of the spirit contained in the fruit. The taste and colour very much resemble crusted port wine, as I have been informed by a lady who made some wine from a few which only took a pound and a half of sugar to make a gallon of the wine, which was of an excellent quality, as testified by her husband, an eminent medical professor.

Probably, if inducements were held out to cultivate the plant, it might be brought to greater perfection than where it grows naturally, or at least might be brought into more use, and planted where the soil is suitable, to make wine, puddings, or tarts, as the berries are made use of for these purposes where they abound, and afford employment to poor persons, who gather and carry them about for sale to the more opulent, similar to what they do here with the bramble berry, besides making use of part for themselves. It has the same quality of discolouring the teeth and lips as the bramble berry.

But, as I have observed before when treating of currant wine, the price of sugar is a subject of great importance to the making these wines, jellies, preserves, &c. from our native fruits, and would be well worthy the attention of Mr Huskisson, the present worthy president of the Board of Trade; for this reason, as well as various others, the common raw or moist sugar will answer most of these purposes as well except for clearness, and perhaps better, than the refined, though I observe in all or the greatest part of the receipts recommended for the rich, nothing will do but the finest lump or powder sugar; for why? because it is the most expensive, may often be the reason.

In the receipt for making currant wine I have said, "the fruit should be picked from the stalks;" but that is not necessary, as the fruit squeezes much better with the hands, stalks and berries altogether, and can be easily separated by draining through a fine sieve or cloth, and saves a vast deal of labour, which is often of great consequence.

Another circumstance I omitted to state concerning the larch training stakes, which it might not be amiss to mention in this place, is, when the larch stakes are cut and used the first year, while the sap is fresh in them, they will not warp or turn crooked in sunny dry weather; but the second year, when the sap is dead or has lost its virtue, and the stakes have become dry, then, in dry sunny weather, the tops or slender ends of the larches warp and bend in various directions, which causes them to look rather unsightly. This circumstance gave me a good deal of concern when I first observed it, but upon the first rain or damp weather they always resumed their straight and upright position. When they are placed in circles, a small narrow hoop or two near the top and middle, and the stakes nailed to them, would keep them at all times in their position. If used for straight fencing, the upper rail might be placed nearer the tops of the stakes; but as there is generally much more damp than dry weather, these precautions might be unnecessary.

Having before stated that nearly all the larch plants, both large and small, planted on the wet and cohesive strong soil in the Chopwell plantations, were dead, I have very lately observed some larch plants full as large as these that have been planted in a very fine young oak wood, which had been cut down the year before, belonging to the Marquis of Bute, the land full as strong, wet, and cohesive as any at Chopwell, if not more so, which was planted about the latter end of February or beginning of March, in the same manner, with a semicircular spade, by taking out only a small spit of soil for the hole about as much as could be held in the two hands; the land had been much trodden, of course by getting out the wood through the preceding excessive wet Autumn and Winter, at this time, (September 1825,) nearly the whole of the plants are alive, and look as well as could be expected, considering such a dry season.—Surely facts like these must be convincing, and of importance enough to be generally known.

SECTION VI.

Hints for an Arboreculturаl Society—Its beneficial tendency.

I sincerely hope that what I have proved and have been endeavouring to explain through this work, may, if only in a small degree, be the means of inducing those noblemen and gentlemen who have extensive plantations, as well as those who have the management of wood lands and plantations for the benefit of others, seriously to reflect and consider of what vast importance it is to attend to the minute as well as the greater circumstances, and to study and understand these matters themselves, as there are but few persons who will do or see the business done so well as the master himself when he understands it, because he of course is, or ought to be, the most interested in such healthy and pleasurable employment; as this, one would think, should be equally as attractive *and far more beneficial* to induce gentlemen to stop in the country on their own estates, as ranging over the fields in pursuit of game.

It must be evident to any gentleman, who reflects upon the subject, what immense profits and advantages may be derived from land of very little value for any other purposes to himself, his children, and posterity, by timely care and skill in the management of plantations! I have not attempted to calculate the profits in pounds, shillings, and pence, per acre; because, I believe, both the profits and losses on either side are alike incalculable, dependant upon local situations, and a variety of other circumstances not necessary to repeat or enumerate.

How gratifying must it be to the heart of the patriot to see fine oak and other woods flourish on barren wilds and uncultivated heaths and mountains, for the future safety and grandeur of his country! And how well deserving of his consideration at this time, when there are such numerous projects for new canals and roads of various descriptions, and easy and cheap conveyances for heavy goods, and which will undoubtedly increase the consumption of wood in various ways!

We have Linnæan, Agricultural, and Horticultural Societies, and numerous other useful associations, which have no doubt done much good; why, then, may we not have an *Arboreculturel* Society (if I may be allowed the term) as much wanted to promote and encourage the art and knowledge of forest tree culture, when it must, I presume, be acknowledged it is *far* behind both Agriculture and Horticulture, to which it is so nearly allied? I as an individual think it would be of infinite importance, for the good of the country in general as well as of individuals, if something of that nature were instituted by Government, or by patriotic gentlemen who have the means, and are willing to combine it with the Horticultural societies, *that practical gardeners may be strongly urged* to study to make themselves proficient in both arts, or rather a branch of the art, of garden-ing; because, it must be admitted, that the care and management of woods and plantations are generally and much too often left to persons who have never studied either the one or the other, and who understand neither the nature or practical part of it—But who are the sufferers?

FINIS.

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ERRATA.

Page 9, line 6 from bottom, for *bruised* read *browsed.*
60, line 7 from top, for *shabby* read *shrubby.*
131, line 7 from top, after *said* add *if.*
225, line 2 from top, for *end* read *err.*
252, line 4 from top, for *plant* read *part.*
265, line 8 from bottom, for *cramps* read *craps.*

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